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contents

VOLUME 46 OCTOBER 7, 1957 NUMBER 20

special articles

Aftermercerization of Methylolmelamine Resin-treated Cotton Fabrics 719
Laurence W Mazzeno, Jr, Robert M Reinhardt, Anthony R Markezich and J David Reid

Design of a Luster-Meter for Quality Control 725
T M Smith, H A Thompson and W I Kaye

The Practical Aspects of Neutral Grease Wool Scouring 731
E J McNamara, Jr

aatcc proceedings

feature articles

Address by the President P739
George O Linberg

Address by the Chairman of the Executive Committee on Research P740
Charles W Dorn

Membership Applications P742
AATCC Calendar P742
Employment Register P742
Activities of the Local Sections P743

departments

Patent Digest 736
Paul Wengraf

Abstracts 737
News of the Trade 745
Names in the News 747
General Calendar 748

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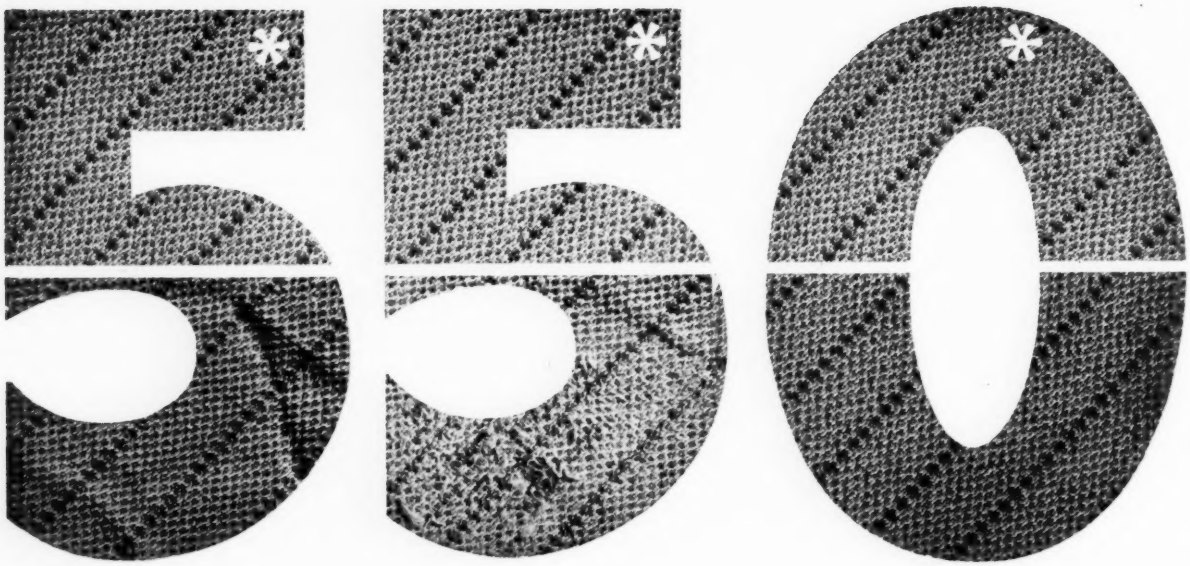

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Volume 46 October 7, 1957 Number 20

AFTERMERCERIZATION OF METHYLOLMELAMINE RESIN-TREATED COTTON FABRICS

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INTRODUCTION

THE effect of mercerization as an aftertreatment for wrinkle-resistant resin-treated fabrics has not been reported in any great detail in the literature. On the other hand, the beneficial effects of premercerization of resin-treated cotton were recognized in the earliest work on such material and more has been published on this subject. The first patent on wrinkle resistance disclosed the advantages of mercerizing, washing free of caustic and treating the wet, swollen cellulosic fibers with methylol type resin-formers (*13*). The report of one of the latest of these investigations of premercerization was awarded first prize in the 1955 AATCC Intersectional Paper Contest (*3*).

Aftermercerization of resin-treated linen was disclosed in a patent issued in 1935 to Tootal Broadhurst Lee Co, Ltd (*12*). The swelling and shrinking action of the caustic was claimed to increase the strength of the treated linen, which is badly stiffened and weakened by resin treatment. Although this patent is quoted from time to time in discussions of wrinkle-resistant fabrics, the process evidently has not been utilized commercially in this country to any great extent. However, there appears to be some use of aftermercerization to salvage cloth which has lost strength excessively due to processing errors.

The Philadelphia section of AATCC in 1952 investigated the effect of variables in the resin treatment of cotton fabrics and touched upon aftermercerization (*9*). In the report of this investigation, it is stated that, because of difficulties in obtaining reproducible results and because aftermercerization "is well known (though perhaps not completely understood), we did not explore this procedure further" after a few experiments which yielded results which were "ambiguous and confusing." A recent article (*2*) reports a double aftermercerization, both slack and then at original dimensions, but no data are given.

In connection with other experiments on the chemical modification of cotton, the authors observed improvement in tearing strength and abrasion resistance of resin-treated cotton cloth when an aftermercerization treatment was given. A repeat of this resin treatment and subsequent mercerization verified the increase and led to further consideration of the factors involved.

This paper reports results obtained on aftermercerization of cotton cloth treated with methylolmelamine—one of the resins used in great volume in this country to impart wrinkle resistance to cellulosic fabrics. Investigation of the effects of aftermercerization on the properties of cotton fabrics treated with other commercially utilized resins will be reported in following papers of this series.

MERCERIZATION OF COTTON

The term "mercerization" is applied to treatments of cotton with caustic soda solution under conditions of caustic concentration and temperature which effect a permanent or irreversible swelling of the cellulose. The completeness of the change due to mercerization varies considerably according to conditions. Strictly speaking, a completely mercerized cotton should show, in the x-ray diffractometer, only the x-ray diffraction pattern of cellulose II. Under the influence of strong alkali the monoclinic unit cell of native cellulose or cellulose I undergoes skewing with a resultant β angle change from 84° to 62°. Only when a cotton fiber is completely free of restraint can this be fully accomplished. In practical applications, this concept is not particularly useful, first because cellulose I is seldom more than partially changed to cellulose II in finishing treatments of textiles, and second, because it is thought that most of the technically important changes in fiber properties do not depend on basic differences in the lattice structure but rather on changes in the amount of accessible material and on changes in the orientation of the crystallites (*8*).

In practical finishing work, therefore, the operator is concerned only with the effect on yarn or cloth, that is, the attainment of permanent high luster, improved dyeing characteristics, increased tensile strength (when mercerized under tension) and similar textile properties. These effects depend primarily upon the swelling of the cellulose of the cotton fiber. Once again, however, the question of completeness arises. Tension affects swelling, as shown by the x-ray diffraction diagram or by microscopic examination, and mercerization is more or less incomplete according to the tension the fibers are under due to high twist or tightness of weave. As an example, many commercially mercerized fabrics that are highly satisfactory from the viewpoint of dyeing and luster, when cross-sectioned and examined under the microscope, appear to have only a superficial mercerization.

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In the present study, it should be pointed out that the term "aftermercerization of resin-treated cotton" refers to treatment of the resin-containing cotton with strong caustic solution. It does not mean that extensive swelling of the fibers has taken place. Certainly, swelling is not extensive, because to the restraining external factors of twist and weave have been added the internal factors of cross-linkage and resin deposition within the fiber. On the other hand, it would appear that a partial and localized swelling might be of considerable importance in increasing the extensibility and therefore the tearing strength of resin-treated cotton. It may be assumed that, except for some slight surface reaction, resin deposition and crosslinkage take place within the accessible areas of the fiber. Presumably, the accessible areas need the resin to confer wrinkle resistance upon the fiber, whereas the crystalline areas are sufficiently resistant to creasing so that satisfactory resistance to wrinkling is obtained. It has been noted that treatment of cotton with a reactive resin reduces fiber extensibility and increases the elastic modulus. However, according to Gagliardi and Nuessle (5), reduction in abrasion resistance is directly brought about by the reduction in extensibility. This is also true of the reduction in tear strength.

If, therefore, fiber extensibility is increased by mercerization or swelling of the crystalline areas without at the same time losing too much wrinkle resistance either by removal of resin from amorphous areas or too extensive decrystallization of the crystalline areas, the tearing strength and abrasion resistance of resin-treated wrinkle-resistant cotton should be considerably improved. It is on this premise that the present work was undertaken.

MATERIALS AND METHODS

The fabric used in this investigation was a 4-oz 80x80 cotton print cloth which had been boiled, bleached and desized. Methylolmelamine (Resloom HP)[2] was applied to produce the wrinkle-resistant finish. Cloth was padded to about 80% wet pickup of 14% methylolmelamine solution containing 5% of catalyst based on the resin content. The catalyst used was 2-methyl, 2-aminopropanol-1 hydrochloride, in the form of a 35% aqueous solution. Cloth samples wet with the prepolymer solution were mounted on pin frames and dried at 60° C for seven minutes after which they were cured on the frames at 150° C for five minutes. The resin-treated cloth was then given a mild process wash to remove the acid catalyst and unreacted resin.

The concentration of alkali used in the after-treatment was set at 20% except where otherwise noted. In order to control shrinkage during the alkali treatment, samples were mounted on pin-frames which were constructed of Plexiglas in which were mounted stainless-steel escutcheon pins. The rows of pins were set eleven inches apart in each direction. Samples were marked at desired lengths and allowed to shrink to eleven inches on the frames. More exact measurements of shrinkage were made by placing marks 20 cm apart in the center of the sample before the alkaline treatment. Total area shrinkage in percent was calculated from the following formula:

$$\% S = \frac{(W_1 \times L_1) - (W_2 \times L_2)}{(W_1 \times L_1)} \times 100$$

where % S is equal to the total area shrinkage, W_1 and L_1 are the original width and length and W_2 and L_2 are the dimensions after mercerization. Mercerization was allowed to proceed for twenty minutes followed by washing and souring (5% acetic acid) on the frames. The final wash was performed on samples removed from the frames. After washing, the samples were dried by pressing with a hand iron and hung to air equilibrate before testing.

Textile testing was carried out under standard conditions of 70° F and 65% relative humidity. Tearing strength by the Elmendorf method (*1a*), flex abrasion resistance on the Stoll abrader (*1b*) and wrinkle recovery by the Monsanto method (*1c*) were determined.

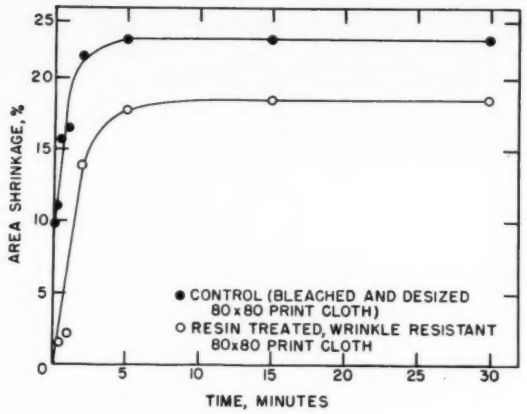
AREA SHRINKAGE, %
TIME, MINUTES
● CONTROL (BLEACHED AND DESIZED 80x80 PRINT CLOTH)
○ RESIN TREATED, WRINKLE RESISTANT 80x80 PRINT CLOTH

Figure 1

Comparative shrinkage of control and resin-treated, wrinkle-resistant cotton fabrics on treatment with 20% sodium hydroxide solution.

RESULTS AND DISCUSSION

Methylolmelamine (Resloom HP) was applied to the print cloth to give approximately 8% final add-on, which produces satisfactory wrinkle resistance with, however, loss in tearing strength of approximately 40% and in abrasion resistance of 50%. Typical results are given in Table I.

TABLE I

Variation in properties of resin-treated print cloth with changes in NaOH concentration

Concentration of NaOH (%)	Tearing strength (Elmendorf) warp lbs	Tearing strength (Elmendorf) fill lbs	Flex abrasion (Stoll) warp cycles	Flex abrasion (Stoll) fill cycles	Wrinkle recovery (Monsanto) warp + fill degrees	% N
30	2.1	1.5	538	599	234	2.9
20	2.0	1.3	462	414	240	3.4
16	1.9	1.2	381	297	241	3.7
13	1.8	1.1	317	342	245	3.8
10	1.5	1.0	225	250	246	4.0
5	1.5	1.0	205	196	261	4.1
Control[1]	1.5	0.9	207	192	258	4.5
Blank[2]	2.5	1.8	506	456	165	...

[1] Control cloth had approximately 8% resin add-on.
[2] Boiled and bleached, desized 80x80 cotton print cloth, untreated.

[2] The mention of trade names and firms in this paper does not imply their endorsement by the Department of Agriculture over similar products or firms not mentioned.

EFFECT OF TIME———With temperature arbitrarily set at room temperature, and using 20% alkali, it was possible to determine the optimum time of application of the alkali to achieve the full effect of improvement. In Figure 1 are shown curves depicting the amount of shrinkage, expressed as a percentage of the total area, versus the time for action of 20% sodium hydroxide solution on untreated and resin-treated fabrics. Both were treated in the slack condition. The control fabric undergoes a large proportion of the shrinkage almost immediately. As would be expected, the resin lends a measure of resistance to the alkali, and shrinkage is somewhat slower. However, the final plateau parallels that of the control sample, the total shrinkage in area being about 80% of the latter. From Figure 1 it can be seen that a large proportion of the action of the alkali takes place in two minutes, and it is essentially complete in five minutes. A similar accurate determination of effect of time could not be carried out when the cloth was treated under tension; however, observation of the manner in which fabric treated with 30% caustic under tension tightened and ripped indicated that the time effect was comparable. Although the plateau shown in Figure 1 was reached in five minutes, all further experiments were allowed to run for 20 minutes to insure the full effect of the treatment.

EFFECT OF SHRINKAGE——— Improvement of textile properties by chemical shrinkage is an attractive possibility and consideration was given to the likelihood that a maximum gain in properties could be obtained with an optimum shrinkage with alkali. A series of samples were shrunk predetermined amounts. However, when tearing strengths were corrected on an area basis, which makes the values comparable for fabrics of equal weight, the amount of shrinkage had no significant effect on tearing strength of treated fabric. Since no relationship between weight and flex life or wrinkle-recovery angle is known, it was not possible to correct these properties allowing for shrinkage. In view of these findings it seemed reasonable to perform this type of treatment in subsequent work herein described, on samples held at original dimensions. It must be mentioned here, though, that even under these conditions there is about 2% shrinkage in both warp and filling directions. This is comparable to the normal 4% loss of area due to shrinkage of the untreated fabric in water.

EFFECT OF ALKALI CONCENTRATION———Since the concentration of alkali has a pronounced effect on the results, a series of samples were treated, with temperature again arbitrarily set for convenience at room temperature (about 25° C), with solutions of sodium hydroxide whose concentration ranged from 5 to 30%. The samples were held to original dimensions on the pin frames. As may be seen from Table I, at concentrations below 13% there are no important changes in properties. At 13% and above, the changes are quite marked with greatest improvement occurring with the 30% solution. Some loss in wrinkle-recovery angle accompanies the improvement in tearing strength and abrasion resistance but the values are still well within the usable range for wrinkle resistance. Evidently, however, this loss in wrinkle recovery is not proportional to loss in resin, as indicated by reduction in nitrogen content. (The effect of resin add-on is discussed below.)

Although greatest improvement in properties was achieved with 30% alkali, it is impractical to use this strength of reagent unless the edges are specially seamed. Shrinkage was great enough to rip the samples from the pin frames. As a compromise, 20% sodium hydroxide solution was used in the succeeding work. This concentration of alkali doubled the abrasion resistance and increased the tearing strength about 35% without causing excessive tension on the fabric and with little loss in wrinkle recovery.

EFFECT OF TEMPERATURE ———Although the work described has been concerned with alkaline treatments at room temperature (about 25° C), the effect of other temperatures has been investigated. As may be seen from Table II, this factor is critical. About 25° C produces optimum improvements in tear and abrasion resistance with minimum loss in wrinkle-recovery angle. At 5° C little change from the control is noticed in the fabric properties. At the higher temperatures from 35° up, wrinkle recovery must be sacrificed to achieve the other qualities. In fact, the value of the recovery angle is below the usable range for wrinkle resistance. Furthermore, there is excessive loss of resin at the higher temperatures. The temperature of 35° C (95° F) is considerably below that often encountered in the mill (6). Consideration of the data given in Table II indicates that the general belief that mercerization destroys wrinkle resistance may stem from work done at higher temperatures. Mercerization of resin-treated cotton in the mill would necessitate cooling of the alkali in order to make the process successful.

EFFECT OF RESIN ADD-ON ———Resin add-on in the fabric must be controlled. Not only are the losses in physical properties of the fabric dependent on resin content but also there is a limit beyond which the beneficial effect of the alkali treatment cannot be achieved. Such relationship is evident from Table III. Tear and abrasion losses increase directly with add-on. Apparently, above 10.5% resin, the alkali cannot penetrate to accomplish its relaxing effect. The tearing and abrasion resistances reduced to a low value by the high add-on of resin are not appreciably improved by the aftermercerization.

It is interesting to examine the nitrogen content of the samples listed in Tables I and II with regard to resin content and wrinkle recovery. The resin-treated control fabrics with approximately 8% resin have nitrogen contents of 4.4 and 4.5%. Even though the nitrogen content drops to approximately 3%, there is little loss in wrinkle recovery. This is especially interesting in view of the work of Lineken and coworkers (7) who

TABLE II

Importance of temperature control in mercerization of resin-treated print cloth

Temperature of NaOH Solution[1] °C	Tearing Strength (Elmendorf)		Flex abrasion (Stoll)		Wrinkle recovery (Monsanto)	
	warp lbs	fill lbs	warp cycles	fill cycles	warp + fill degrees	% N
5	1.7	1.1	307	251	241	4.0
25	2.0	1.3	462	414	240	3.4
35	2.2	1.6	567	551	204	2.7
45	2.3	1.6	768	659	199	2.1
60	2.3	1.7	875	886	194	1.1
Control[2]	1.6	1.0	240	265	242	4.4
Blank[3]	2.5	1.8	506	456	165	...

[1]NaOH concentration was 20%.
[2]Control cloth had approximately 8% resin add-on, not mercerized.
[3]Blank is boiled and bleached, desized 80x80 print cloth, untreated.

found that, on acid hydrolysis, the loss of only 10% of the resin content of a treated fabric reduced the wrinkle recovery due to the resin by 80%. In the present case the loss of 25% resin causes only a negligible change in wrinkle recovery. A possible explanation of this phenomenon has been suggested by Fortess (*4*). He proposes that the improvement in tear and abrasion resistance is a function of removal, by alkali solubilization, of the melamine resin, particularly that which is deposited on the surface and in the microscopic fissures and cracks. In this way the surface-deposited melamine resin is removed without affecting the deeply penetrated resin which has crosslinked the accessible and swellable regions of the cotton fiber. On the other hand, acid hydrolysis must sever the important crosslinkages which produce the wrinkle resistance.

EFFECT OF PREMERCERIZATION——In Table IV is given a comparison of samples prepared by various combinations of premercerization, resin treatment, and aftermercerization. These show very well the improvement obtained by alkali treatment. Mercerization either before or after resin treatment considerably increases the tearing strength. However, the abrasion resistance of the aftermercerized sample is greatly superior to the other samples. No appreciable loss in wrinkle-recovery angle is noted. It would appear from these data that, unless premercerization were required for some other purpose, aftermercerization would be preferred for retention of the maximum percentage of original physical properties.

DURABILITY TO LAUNDERING——The recovery of properties achieved on aftermercerization of resin-treated fabrics was found to be durable through at least six laundry cycles as shown in Table V. Admittedly, laundering alone apparently causes some improvement in flex abrasion, which was subsequently lost, but the aftermercerized samples are consistently higher than the controls in both tearing strength and abrasion resistance. Wrinkle-recovery angle remains essentially constant throughout the process.

ELASTIC RECOVERY, PERMANENT SET AND CYCLIC LOADING——The elastic properties imparted to the fabrics by the methylolmelamine treatment are stable to the action of the mercerizing caustic. This is evident from the investiga-

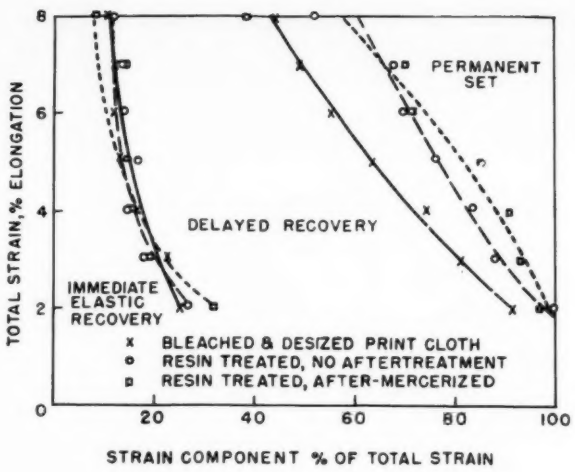

Figure 2
Elastic recovery and permanent set of A) bleached and desized 80x80 cotton print cloth; B) resin-treated cloth, no aftertreatment; and C) resin-treated cloth, aftermercerized at original dimensions.

TABLE III
Effect of resin content in aftermercerized wrinkle-resistant fabric

Resin Content (%)	Tearing strength (Elmendorf) control warp lbs	Tearing strength (Elmendorf) control fill lbs	Tearing strength (Elmendorf) mercerized warp lbs	Tearing strength (Elmendorf) mercerized fill lbs	Flex abrasion (Stoll) control warp cycles	Flex abrasion (Stoll) control fill cycles	Flex abrasion (Stoll) mercerized warp cycles	Flex abrasion (Stoll) mercerized fill cycles	Wrinkle recovery (Monsanto) control warp+fill degrees	Wrinkle recovery (Monsanto) mercerized warp+fill degrees
0[1]	2.5	1.8	2.5	1.6	506	456	606	575	165	195
6.2	1.4	0.8	1.9	1.1	139	120	286	197	248	235
7.8	1.4	0.9	1.7	1.1	129	118	273	199	250	235
8.4	1.4	0.8	1.7	1.1	108	126	255	229	245	234
10.4	1.3	0.8	1.6	1.0	117	104	220	157	251	250
13.1	1.3	0.6	1.3	0.8	74	84	104	64	269	282
19.8	1.1	0.6	1.0	0.6	80	52	97	64	241	228

[1]Boiled, bleached and desized 80x80 cotton print cloth, untreated.

TABLE IV
Mercerization of resin-treated print cloth

Pre-mercerized[1]	Resin-treated	After-mercerized[1]	Tearing strength (Elmendorf) warp lbs	Tearing strength (Elmendorf) fill lbs	Flex abrasion (Stoll) warp cycles	Flex abrasion (Stoll) fill cycles	Wrinkle recovery warp+fill degrees
—[2]	—	—	2.5	1.8	506	456	165
—	X	—	1.5	1.0	165	154	257
—	X	X	1.9	1.2	269	245	242
X	X	—	1.8	1.2	126	127	269
X	X	X	1.9	1.2	237	271	248

[1]Mercerization with 20% NaOH at room temperature for 20 minutes with fabric held at original dimensions.
[2]Boiled, bleached and desized 80x80 cotton print cloth, untreated.

TABLE V
Launderability of aftermercerized wrinkle-resistant cotton print cloth

Laundry Cycles[1]	Tearing strength (Elmendorf) control warp lbs	Tearing strength (Elmendorf) control fill lbs	Tearing strength (Elmendorf) mercerized[2] warp lbs	Tearing strength (Elmendorf) mercerized[2] fill lbs	Flex abrasion (Stoll) control warp cycles	Flex abrasion (Stoll) control fill cycles	Flex abrasion (Stoll) mercerized[2] warp cycles	Flex abrasion (Stoll) mercerized[2] fill cycles	Wrinkle recovery (Monsanto) Control warp+fill degrees	Wrinkle recovery (Monsanto) Mercerized warp+fill degrees
0	1.5	1.0	1.9	1.2	165	154	269	245	257	242
1	1.7	1.0	1.9	1.2	284	186	271	299	257	249
2	1.5	1.0	1.7	1.1	237	237	314	288	245	248
3	1.4	0.8	1.7	1.1	270	155	266	209	251	252
6	1.5	0.9	1.7	1.0	189	100	227	173	251	245

[1]Laundering procedure: AATCC No. 14-53 except temperature 160° F.
[2]Mercerization performed at original dimensions with 20% sodium hydroxide for 20 minutes at room temperature.

TABLE VI
Microscopical examination of mercerized and resin-treated fabric

Sample number	Treatment: Pre-mercerization[1]	Treatment: Resin add-on	Treatment: After-mercerization[1]	Cross-sectioning	Dyeing[2]	Refractive Index[3]	Refractive index after resin stripping
1	—	—	—	not swollen	resist	1.578	—
2	S	—	—	highly swollen	resist	1.568	—
3	O D	—	—	swollen	resist	1.571	
4	—	8.5%	S	swollen	dyed	1.570	1.568
5	—	8.5%	O D	swollen	dyed	1.583	1.578
6	—	8.5%	—	slightly swollen	dyed	1.587	1.578
7	S	8.5%	—	highly swollen	dyed very deeply	1.582	1.568

[1]Mercerization with 20% NaOH at room temperature for 20 minutes. S = slack; O D = original dimensions.
[2]Dyeing performed with Kiton Pure Blue V, buffered to pH 3.
[3]Refractive Index taken parallel to axis of fiber (η_γ).

tion of immediate recovery, delayed recovery and permanent set as measured on the Instron at a rate of extension of 33% per minute and illustrated in Figure 2. The permanent set of cotton fabric is substantially reduced by the resin treatment and is reduced further by the aftermercerization at original dimensions. The immediate recovery is substantially identical on the three samples. Cyclic load of the specimens of the three samples to 4% elongation showed that, after 20 cycles, the base of the hysteresis loop of the untreated fabric had shifted to the 2% point, while for the two treated samples the base of the hysteresis loop started at the 1.5% point. Thus there is evidence that the treatment induced greater dimensional stability, that is, a reduced tendency toward "bagginess."

EXTENT OF "MERCERIZATION"

Throughout this paper the authors have employed the terms pre- and aftermercerization to describe the treatment with alkali before and after resin treatment. However, as mentioned earlier, this is not intended to imply that a condition even approximating complete swelling and change of crystal lattice for cellulose I to cellulose II has taken place. The tightness of the weave in the print cloth used is sufficient to prevent much change from taking place even when performed without tension on the fabric.

A complete determination of the degree of mercerization is outside the scope of this paper. The express purpose of this research is to illustrate the improvement of the tearing strength and abrasion resistance of fabric treated with methylolmelamine. However, evidence has been acquired which indicates some of the changes which have occurred in the cotton fibers. Although mercerization is not complete, nevertheless, it may be the cause of the improvements noted.

MICROSCOPICAL INVESTIGATION——A series of fabric samples representing various combinations of mercerization and resin treatment were subjected to microscopical examination. Observation of portions dyed with Kiton Pure Blue V (*CI* 42045) showed that the resin was uniformly distributed in the fiber. Table VI presents a summary of the observations.

When cotton is completely mercerized, the cross-section appears to be highly swollen, in fact, almost round, with a rather small lumen. It is quite evident in this work that the alkali has a swelling effect on the resin-treated fabric. The fibers have a swollen appearance which is intermediate between typical raw and typical mercerized cotton.

The indexes of refraction, measured parallel to the fiber axis, also listed in Table VI, were determined by the method of Becke as described by Preston (*10*). Untreated cotton fiber, with an index of 1.578, decreases to 1.568 when slack mercerized, and increases to 1.587 when impregnated with resin. (The latter figure varies somewhat according to the amount of resin present.) From the data shown it appears that the same effect is obtained whether resin-treated fabric is slack mercerized prior or subsequent to application of the resin. After the resin is stripped from both samples the index of refraction values are identical with that of slack-mercerized cotton at 1.568. Unfortunately, the evidence is not as clear on the cotton, which was resin-treated and then mercerized under tension. At this point the index was 1.583. However, on stripping, the index dropped only to 1.578 as compared with 1.571 for untreated cotton mercerized under tension. It was concluded, from microscopical examination, that in samples mercerized under tension, the resin exerted a considerable restraint upon the swelling of the cotton by mercerizing strength caustic solutions, but that swelling did occur.

TABLE VII
Moisture regain of resin-treated and mercerized cotton fabrics before and after stripping

Treatment	Moisture regain (%): No stripping	Moisture regain (%): After stripping[1]
Blank (untreated)	6.3	6.7
Resin-treated (9% add-on)	5.2	6.6
Slack mercerized cotton	7.9	8.2
Cotton mercerized at original dimensions	7.3	7.8
Resin-treated and slack mercerized	7.5	8.0
Resin-treated, mercerized original dimensions	7.3	7.7

[1]Treated with solution of 1.5% phosphoric acid containing 5% urea at 80-85° C for 30 minutes.

MOISTURE REGAIN —— The moisture regain of cotton varies somewhat with the amount of mercerization, or opening, which occurs, so attention was turned to regain as a means of determining the effect of mercerizing caustic solution on the resin-treated cotton. In a typical case, the moisture regain of untreated cotton (6.3%) was less than that for cotton mercerized in the slack condition (7.9%) or mercerized under tension (7.3%). The moisture regain of resin-treated cotton was only 5.2%. If the resin-treated cotton is mercerized slack or at original dimensions, the respective regains are 7.5% and 7.3%. These results clearly indicate the swelling effect of the caustic solutions on resin-treated cotton.

Work with the index of refraction and the x-ray pattern had been done with stripped samples using urea-phosphoric acid solutions (1.5% phosphoric acid and 5% urea) to remove the resin. The same set of samples described above was treated with the stripping solution. The results are given in Table VII. It may be seen that the stripping solution opened the cotton slightly, increasing the moisture regain 0.3 to 0.5%. In each case, removal of the resin restored the stripped cotton to the expected condition.

X-RAY DIFFRACTOMETER EXAMINATION —— Conversion of cellulose I to cellulose II by the action of mercerizing-strength caustic can be judged best by the x-ray diffraction pattern. A sample of resin-treated cloth was aftermercerized slack and at original dimensions, and then all, including the original untreated fabric, were subjected to the urea-phosphoric acid stripping treatment to remove all resin. This places all samples on a comparable basis and eliminates the dilution factor caused by presence of the resin. Figures 3 and 4 give the tracings showing the effects. These tracings

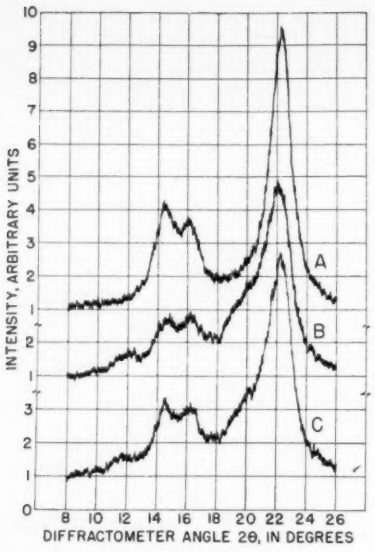

Figure 3
Diffraction patterns of A) untreated (bleached and desized) 80x80 cotton print cloth; B) print cloth mercerized under tension; and C) print cloth, slack mercerized.

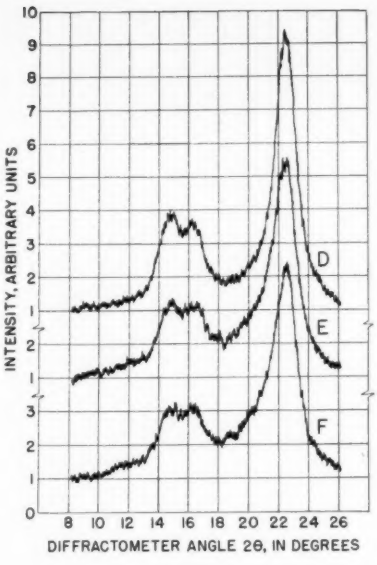

Figure 4
Diffraction patterns of D) resin-treated print cloth; E) resin-treated print cloth, aftermercerized under tension; and F) resin-treated print cloth, aftermercerized slack.

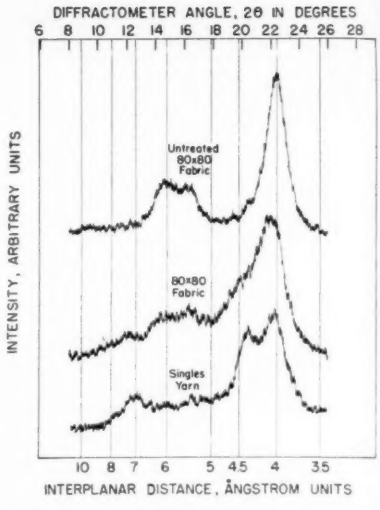

Figure 5
Diffraction patterns of slack mercerized fabric and singles yarn compared with that of untreated cotton. (From Segal and Conrad (*11*)).

are not intended as a quantitative measure of crystallinity, but do indicate qualitatively that a change has been brought about by the alkali. Furthermore, the change in the mercerized resin-treated cotton approximates that in the untreated cotton under similar conditions of mercerization.

In Figure 3, trace A of the stripped cotton is typical of a highly crystalline cellulose I. Traces B and C are typical of cotton fabric which has been mercerized under tension and slack respectively. There is a reduction of cellulose I interferences (reduced crystallinity) and only small indications of formation of cellulose II. As would be expected, the fabric mercerized slack (Trace C) has progressed slightly but definitely further than that under tension (Trace B). Figure 5, taken from the work of Segal and Conrad (*11*), is given to illustrate the change in diffraction pattern which occurs when cotton fabric and yarn are mercerized slack under optimum conditions. The singles yarn gives a good cellulose II pattern, while in the fabric the restraints of construction have caused an incomplete conversion to cellulose II. It may be seen, therefore, from Figure 3, that the mercerized cottons giving traces B and C are only slightly converted to cellulose II. However, it must be emphasized that these two samples are representative of good commercial mercerizing, and would be considered to be well and satisfactorily mercerized by the practical finisher.

In Figure 4, traces D, E and F are from the resin-treated samples corresponding to those of traces A, B and C of Figure 3. The shape of the tracing is essentially identical between pairs: blank and resin-treated, the slack mercerized and resin-treated—slack mercerized, and the mercerized at original dimensions and resin-treated-mercerized at original dimensions. However, when tracings were superimposed, it was evident that the resin treatment had exerted a slight restraining effect upon the mercerizing action. It is definite that complete conversion to cellulose II is not even approached in these treatments, but it is equally evident that a swelling of the resin-treated cotton fabric takes place during mercerization, which is comparable, but slightly less than that which takes place during mercerization of ordinary cotton fabric.

SUMMARY AND CONCLUSIONS

Aftermercerization of methylolmelamine-treated 80x80 print cloth improves the tearing strength of the fabric as much as 20%, and abrasion resistance up to 100%. Wrinkle-recovery angle is only slightly diminished by the treatment.

Optimum conditions for this process are: resin content, 6-10%; alkali concentration, 20%; time of mercerization, 20 minutes; and temperature of mercerization, 25° C.

Durability of the improvements imparted by the alkaline treatments has been shown by laundering through six standard cycles by the AATCC Method No. 14-53 modified to use 160° F as laundering temperature.

A comparison of premercerized and aftermercerized, resin-treated fabrics shows that more benefit in strength properties is achieved with the aftermercerization process.

Data have been presented which qualitatively explain the action of the alkali on the resin-treated fabric.

ACKNOWLEDGMENTS

The authors are indebted to Leon Segal and Joseph Creely for the x-ray data presented, to Ines V deGruy for the microscopical examinations, to George I Pittman for preparing the figures, and to John D Tallant for helpful suggestions and assistance in acquiring the Instron data.

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DESIGN OF A LUSTER-METER FOR QUALITY CONTROL

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Beckman Instruments, Inc
Fullerton, Calif

This paper describes the design of an electronic device for measuring the comparative luster values of yarns.

The instrument monitors the difference in reflectance between a magnesium oxide reference sample and a yarn sample at the angle of specular reflection 45° to the normal to the plane of the yarn. This is accomplished by means of a regulated incandescent light source, a collimating system without lenses, a light modulator consisting of a synchronous motor and rotating sector, a vacuum type phototube, amplifier, detector, and meter. The meter automatically responds to the differences between the reflected intensities of the yarn and reference samples.

Details of design and construction of the instrument, along with studies of the following, are included in this report: luster vs. percent ash; luster vs. twist; luster vs percent lubricant; luster vs winding tension; and luster distribution.

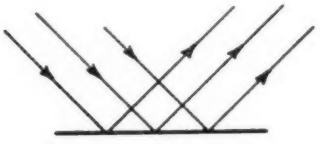
A brief maintenance history also is included.

INTRODUCTION

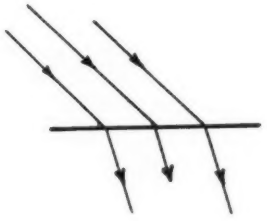
THE subject of luster characteristics of fibers and fabrics is not new. The many facets of luster and luster analysis have been discussed in the literature (*1, 2, 4, 5, 6*). Many complex factors must be considered in the studies of luster characteristics of fibers, including physical, physiological, and psychological aspects. However, in the design of an instrument to measure luster values, the physical aspect remains the most prominent.

THEORETICAL BACKGROUND

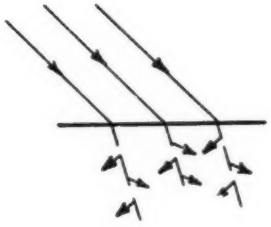
When a beam of light strikes the surface of a material, it may be reflected, refracted, or absorbed as shown in Figure 1. All of these contribute in some degree to the luster characteristics of a material, but that quality with which luster is primarily concerned is reflection. Surfaces may reflect light in several manners, as shown in Figure 2. In specular reflection, the angle at which the light strikes the surface (angle of incidence) is equal to the angle at which it leaves (angle of reflection). When the surface disperses, or scatters the incident light, the term *diffuse reflection* applies. Actually, most reflection is a combination of specular and diffuse components (Figure 2).



A
REFLECTION

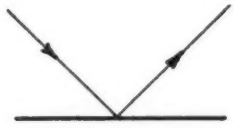


B
REFRACTION



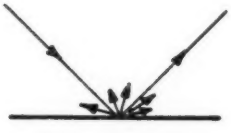
C
ABSORPTION

Figure 1



SPECULAR

DIFFUSE



COMBINATION

Figure 2

In a luster analysis of fibers, it is very important to consider the direction at which the incident light strikes the fiber, as illustrated in Figure 3. It is quite evident that a significantly greater amount of light will be reflected in the fiber direction (A).

Differences in fiber cross section contribute to significant differences in luster readings. For example, fibers with round cross sections will have higher luster values than those with irregular cross sections, other things being equal.

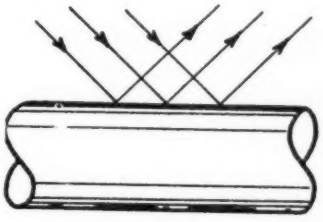
Of utmost importance in luster analysis of fibers is the manner in which the fibers are mounted. The most practical means has been to lay the fibers side to side on a flat surface, insuring that sufficient layers are wound to present a solid yarn surface to the incident beam.

In the measurement of the reflective qualities of various substances, certain angles of incidence are recommended (*9*) as shown in Table I.

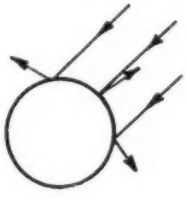
The American Society for Testing Materials has made progress in the standardization of measurements of luster, gloss, etc, in several fields, but as yet no suitable standard has been agreed upon for textiles.

HISTORICAL BACKGROUND

In a publication by Quynn, Bernet,



A



B

Figure 3

TABLE I

Substance	Recommended Angle	Source
Paints and varnishes	60°	ASTM Method D-523
Flat paints	85°	ASTM Method D-523
Paper and paper board	75°	TAPPI Method T480M-51 ASTM Method D-1223-52T ASTM Method D-525-53T
Color printing and printing inks	60°	
Porcelain enamel, ceramics and glass	45°	Porcelain Enamel Institute
Plastics, floor tiles, linoleum, wall boards, and wall tiles	60°	ASTM
Metal surfaces, electroplating, mirrors	45°	
Textiles	45°	

and Fischer (4), various means of measuring luster have been listed. These include single-angle viewing, two-angle viewing, goniophotometric methods, and polarization methods. The goniophotometric method allows for scanning the complete reflective field of the fabric; therefore it is the most versatile method used. Figure 4 illustrates the voltage output of a goniophotometer, showing bright yarn, dull yarn, and a mirror vs reflection angle. The single-angle viewing method is not as versatile as the goniophotometric system, but has the advantage of simplicity and speed of operation.

The first luster-measuring device used in these laboratories was designed by Bailey, Morey, and McNally (7), and was constructed to satisfy the need for a quality control instrument. The single-angle method was chosen and a 6-volt, 50 cp headlight bulb was used as the light source. A lens was utilized to focus the beam onto the surface to be examined. The angle of incidence and reflection was 45°. The sensitive element was a Weston photronic cell, which was read on a sensitive galvanometer. This instrument was in use until the present unit was designed.

The new design incorporates features which are improvements over the former unit. First, the lamp is AC, and is operated at less than 60% of its rating, which serves to extend its life. Changing and aligning the lamp is no problem, since no lenses are used to collimate the light. A vacuum phototube is used with an alternating current source, which lends itself to easy amplification; thus the use of a sensitive, rugged, and reproducible meter is allowable. With such a design, readings are instantaneous, accurate, and reproducible.

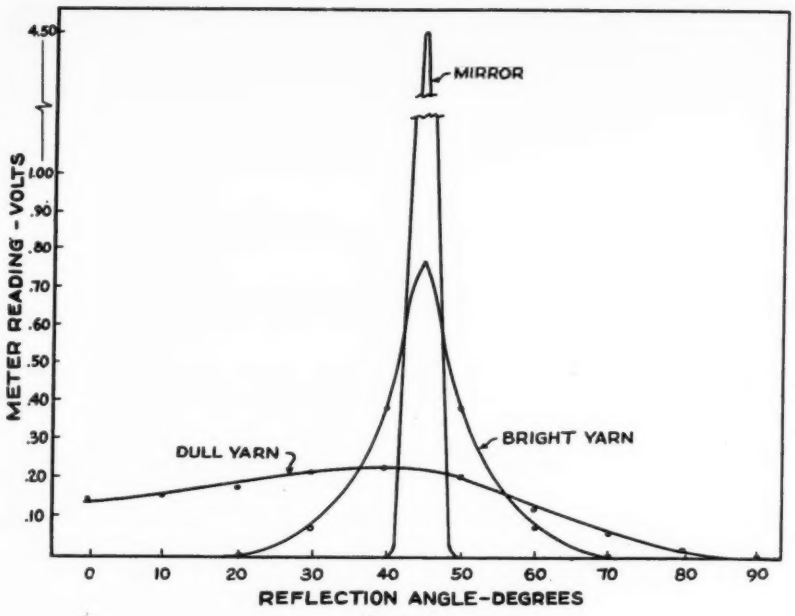


Figure 4

INSTRUMENT DESIGN

The material to be covered in this paper may be divided into two parts:

1) Development of a luster-meter for rapid quality control.

2) Study of factors contributing to the luster of acetate yarn.

An improved luster-meter was designed to obtain the same type of information previously determined by the original meter. It was desired that the instrument meet the following requirements: that it afford an accurate measurement of the reflective qualities of yarn; that it be relatively inexpensive, simple to operate and maintain; and that it be reliable enough for twenty-four-hour-a-day continuous operation, and reproducible over long periods of time.

There are many different approaches to the design of a luster-meter. After a survey of the literature, it was decided that the best design would be one monitoring the difference in reflectance between a magnesium oxide reference sample and a yarn sample at the angle of specular reflection 45° to the normal to the plane of the yarn. This would be accomplished by the use of a regulated incandescent light source, a collimating system without lenses, a light modulator consisting of a synchronous motor and rotating sector, a vacuum type phototube, amplifier, detector, and meter. The meter would respond automatically to the difference between the reflected intensities of the yarn and reference samples. The use of an interrupted, or modulated beam producing an AC voltage has several advantages: it is simpler and less expensive to amplify; it allows the use of a more rugged meter, less susceptible to vibration. A simple line diagram of the luster-meter is shown in Figure 5.

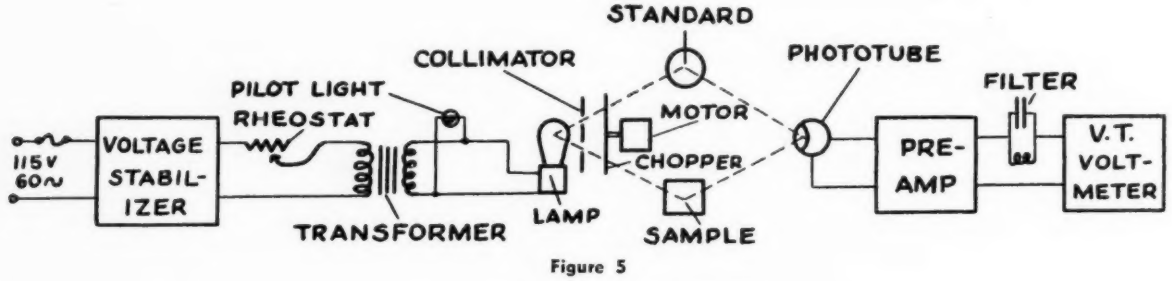


Figure 5

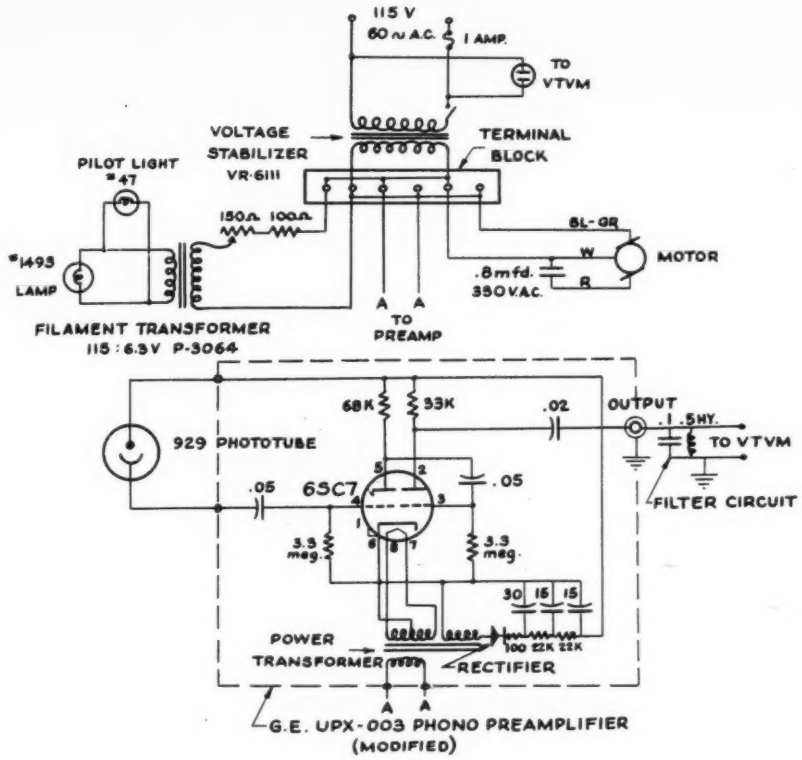


Figure 6

ELECTRICAL CIRCUIT —— In Figure 5, assume a dividing line drawn vertically through the standard and the sample. The portion of the circuit to the left of the dividing line is essentially the lamp circuit and the portion to the right the phototube circuit. In Figure 6 is shown the complete circuit diagram.

Included in the electrical circuit are the following components:

Raytheon Voltage Stabilizer Model VR 6111—30 watts

General Electric medical lamp No. 1493—6.5 volts

Stancor Filament Transformer P-3064—6 amps

Ohmite 150 ohm 25 watt rheostat and 100 ohm 20 watt resistor

General Electric pilot lamp No. 47 (6-8 volts) and base

The lamps are operated at 3.5—4.5 volts, which greatly extends lamp life.

The motor circuit supplies 115 volts, 60 cycles AC to a Fairchild synchronous capacitor motor-model 805-D1-3600 rpm. The capacitor, connected as shown on the diagram, is rated at .8 microfarad, 220 or 330 VAC.

The phototube circuit, which also includes the preamplifier and filter, is also shown on the diagram in Figure 6. The tube chosen is an RCA 929 vacuum phototube. The 929 tube has RCA's S-4 spectral response curve, with a wave-length of maximum response at 4000 ± 500 Angstrom units, which is near the ultraviolet. There is little response near the infrared. The human eye has its peak around 5500 Angstrom units, which is in the green region of the spectrum. Here, then, is an added advantage of running the light at low voltage. The lowered voltage shifts the source light from the ultraviolet toward the infrared. This in effect places the peak of the lamp's response wave nearer that of the eye, which is the ideal situation. Since the phototube favors the ultraviolet, there is additional balance afforded by increasing the infrared from the lamp. In other words, the overall superposition of the curves will result in a fairly well-balanced overall response curve which will peak somewhat nearer the response curve of the eye. Since titanium dioxide, the delusterant used for acetate yarns, reflects essentially no light in the ultraviolet region, this move further increases the accuracy of observations on dull yarns. In addition to the proximity to the eye's response under these conditions, the vacuum phototube has several other advantages: it has, generally speaking, higher internal resistance, greater reproducibility, less drift, greater sensitivity, and less susceptibility to damage than the gas types; it yields sufficiently high output current for easy amplification; the linearity of output current with light intensity is excellent and the output current is essentially constant over a wide range of plate voltages.

The plate supply voltage for the 929 tube is tapped off the power supply of the preamplifier used in the phototube circuit. This is a General Electric Type UPX 003 phonograph preamplifier normally used with a variable reluctance phonograph cartridge. Although the unit can be used without modification of the internal circuit, slightly more gain can be realized by removing the bass compensating circuit. This circuit included a 220,000 ohm resistor, a 27,000 ohm resistor, and a .01 microfarad capacitor. In the preamplifier, it originally served as a compensating circuit for the average recording characteristic of various record manufacturers. This gave essentially a rising characteristic in preamplifier output at frequencies below 500 cps. to compensate for a corresponding cut at these same frequencies in the manufacture of the record. This, of course, is not necessary for work on the luster-meter, which is at one frequency. The voltage on the phototube anode from the preamplifier supply is 95-100 volts. The maximum rated voltage is 250 DC volts; therefore, the tube is being operated at slightly more than one-third its maximum rating. This is conductive to greatly increased tube life. The phototube cathode emits electrons to the positively charged plate, in relation to the intensity of light striking the cathode surface. This causes a small current to flow in the interconnected circuit, which, in this case, is the preamplifier. The cathode of the phototube is wired to the grid of the 6SC7 preamplifier tube through a .05 microfarad capacitor as shown on the diagram.

The output of the preamplifier is fed into a filter circuit composed of a 500 millihenry inductor and a 0.1 microfarad capacitor. The filter circuit serves to minimize response except that near the operating frequency of 720 cycles per second. This circuit reduces the "noise" created by outside lighting fixtures, as well as that created by the 60-cycle light source and stray pickup within the unit itself. The gain of the system is reduced somewhat by the addition of the tuned circuit, but the gain in signal-to-noise ratio more than compensates for the overall loss in gain.

The indicating meter is a Hewlett-Packard Model 400C AC vacuum tube voltmeter. This is an accurate (3%) and extremely sensitive meter; however, only the 1-volt scale is used for luster-meter readings. It has been found that the Heathkit AC vacuum tube voltmeter kit, Model AV-2, is perfectly satisfactory for this job, and in kit form the cost is about 15% of that of the Hewlett-Packard meter.

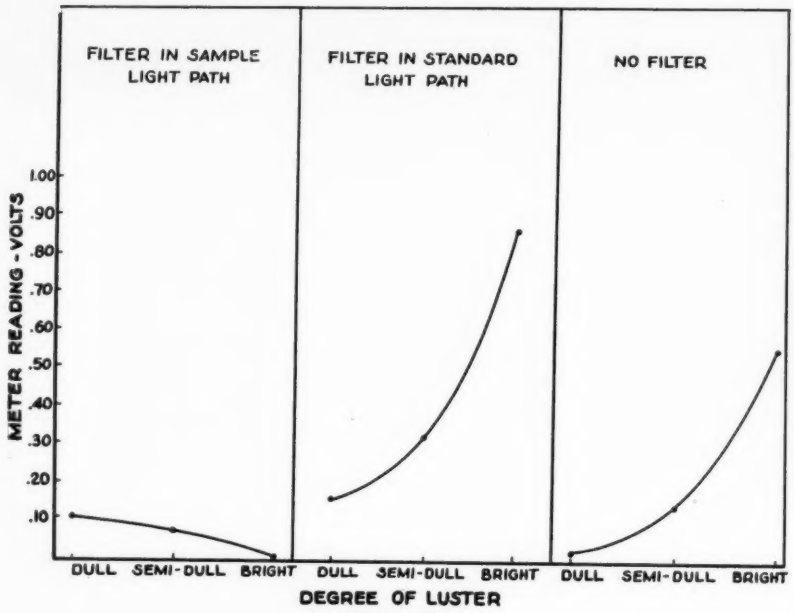


Figure 7

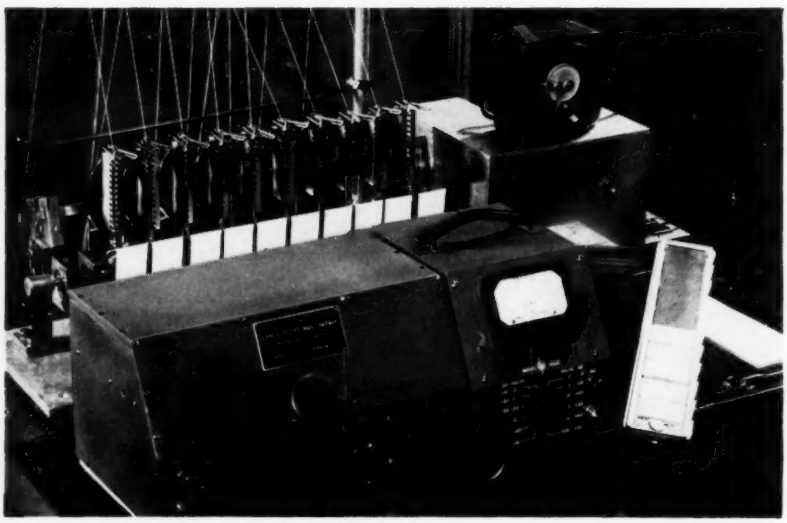


Figure 8
Luster-meter and associated equipment

The accuracy of the Heathkit is 5%. Added to the cost of the kit, of course, is assembly cost.

OPTICAL SYSTEM——In the present luster-meter, no lens is used. The optical system consists of the light source, its housing, and four circular holes (two for each beam) which serve to collimate the light.

The unit is so designed that the beams strike both sample and standard at 45° and leave at the same angle. The light originates at one point, is split into two beams, and is collected at a common point. Furthermore, the source and collector are in the same horizontal plane, equidistant from the centerline between sample and standard. The vertical plane drawn through source and collector is parallel to the plane of the sample face, and the plane of the standard is inclined 28° from the vertical. The phototube is tilted to allow the light sensitive surface to bisect the angle between the beam from the standard and that from the sample.

In order to make the readings from the present meter comparable to readings from the old meter, it was necessary to place a neutral density filter in the path of the standard beam. This reduced the sensitivity somewhat, but by a system of trial and error with a transparent gray scale filter, it was possible to make the readings directly comparable. The filters were obtained by evaporating aluminum onto a glass slide under a vacuum. Figure 7 illustrates the effect of the filter on the output voltage.

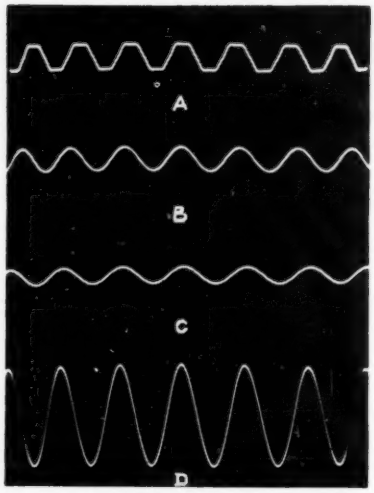


Figure 9
Photo of waveshapes

MECHANICAL SYSTEM——The physical appearance of the unit was determined by the shape of the Hewlett-Packard meter with which it was to be used. Figure 8 pictures the completed meter with the panel winder, timer, and a partially filled panel in the background.

CALIBRATION——The complete unit was wired and assembled and adjustments made until design criteria were satisfied. The beams of light were reflected by mirrors onto the phototube until the spots were correctly aligned. This was determined by alternately covering the sample and standard beam and noting the voltmeter deflection with each setting. The positions were then adjusted until the readings were exactly the same. This was checked by substituting magnesium oxide samples for the mirrors and interchanging the samples. No more than .003 volts difference was shown by interchanging the positions of the sample and standard plaques. The unit was then analyzed with an oscilloscope, with the results as shown in Figure 9. These are unretouched photographs of the wave shapes generated by the luster-meter, taken from the face of the oscilloscope. Curve A shows the unfiltered wave generated with a magnesium oxide standard in place and a ground glass plate in the sample slot. Curve B pictures the same condition with the filter circuit in place. The wave shape now is sinusoidal. The voltage represented by 'B' is actually less than that in 'A', since all those frequencies not in the neighborhood of 720 cycles per second are virtually

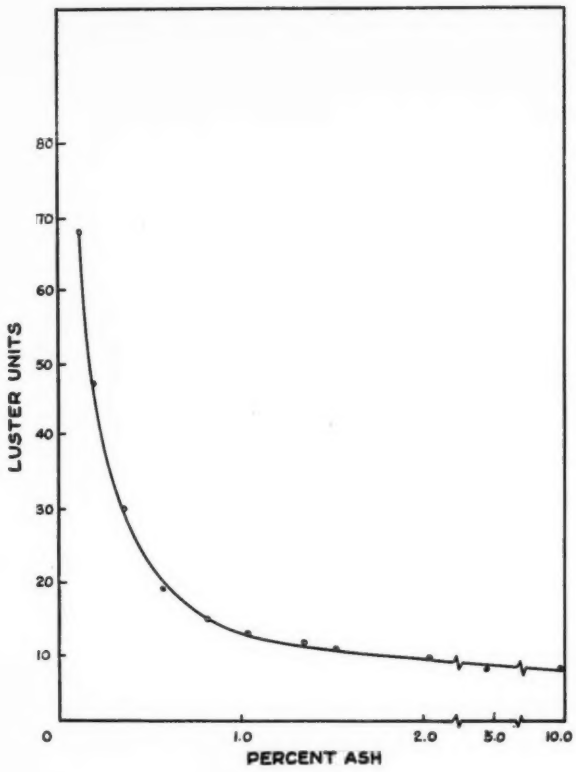


Figure 10

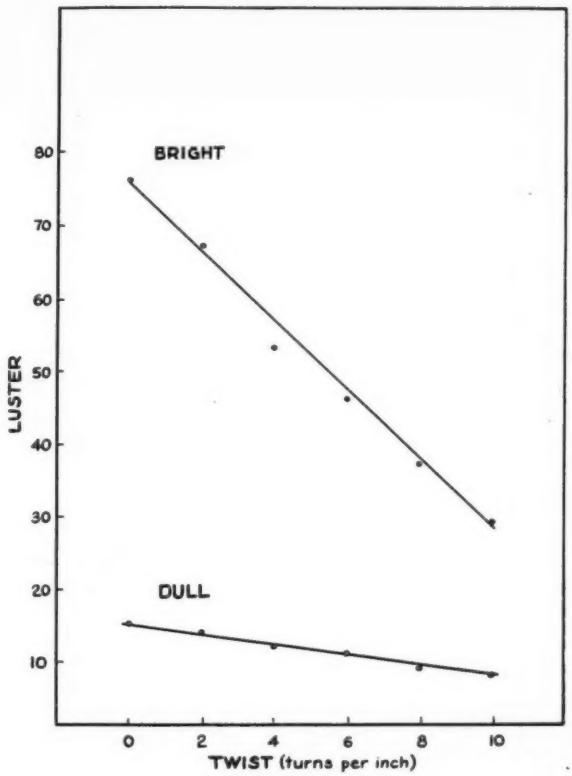


Figure 11

eliminated by the filter. Of course, the impedance of the circuit accounts for some voltage loss. Curve C represents the waveform of a dull yarn with a luster rating of 11. 'D' shows a bright yarn with a luster rating of 70. 'C' and 'D' are pictured on the same scale, thus the amplitudes of the wave shapes (which determine the luster values) are comparable.

When calibrated with a mirror in the sample slot and a magnesium oxide plaque in the standard slot, the voltmeter read 440 luster units, or 4.40 volts. As a further basis for comparison, a black and a white plaque referred to in ASTM Method D-293 were tested. Based on a mirror reading of 1000, the black read 94 and the white, 39 units on the glossmeter at a 60° angle. On the luster-meter, at 45°, the samples read as follows: black 63; white 45.

PROCEDURE AND DATA

To insure the greatest uniformity in measuring luster, it is necessary to wind the yarn in parallel layers. This is done on a special plaque-winding device. The rotary speed is held constant, and the traverse speed is changed to compensate for yarns of different denier in order to present as flat and uniform an area as possible to the light. The luster-meter is then standardized using a ground glass panel of known luster value. The plaque of yarn is moved in position in the slot and the luster values read from the voltmeter.

Factors relating to luster which have been investigated include titanium dioxide content, twist, percent lubricant, winding tension, and distribution among bobbins, the yarn being cellulose acetate in all cases.

LUSTER VS TITANIUM DIOXIDE CONTENT (PERCENT ASH)——— Figure 10 illustrates luster value vs titanium dioxide content, represented as percent ash on the 'X' axis. Two bobbins were prepared at each percentage TiO_2 and five luster readings were made on each bobbin. Ash analysis was checked on all the samples. The results are shown in Table II.

TABLE II

Sample	*Percent Ash*	*Luster*
1	.092	67
2	.186	46
3	.348	29
4	.561	18
5	.802	14
6	1.061	12
7	1.351	11
8	1.521	10
9	2.054	9
10	4.091	7
11	8.993	7

The addition of 0.2% titanium dioxide reduced the luster to one-half its delusterant free value. However, an increase in delusterant from the 1% level to the 10% level caused a luster difference of only 5 luster units.

LUSTER VS TWIST ——— Two bobbins of bright yarn with a luster value of 75 and two bobbins of dull luster yarn with a value of 14 were twisted to 2, 4, 6, 8, and 10 turns/inch. Luster values were then read from the luster-meter and results plotted on Figure 11. As evidenced on the chart, there is a linear decrease in luster with an increase in twist for both bright and dull yarn. The decrease in the bright sample is much more marked than that for the dull, however. The bright yarn drops from a high of 75 to a low of 28 luster units, while the range for the dull sample is from 14 down to 7 luster units. Percentagewise, this represents a 63% loss of luster for the bright and a 50% loss for the dull sample.

LUSTER VS PERCENT LUBRICANT———Five bobbins of 150 denier bright yarn were prepared with each of five lubricant levels. The results are shown in Table III and plotted on Figure 12.

TABLE III

Percent Oil	*Luster*
1.44	64
2.36	63
2.49	61
2.82	60
3.86	58

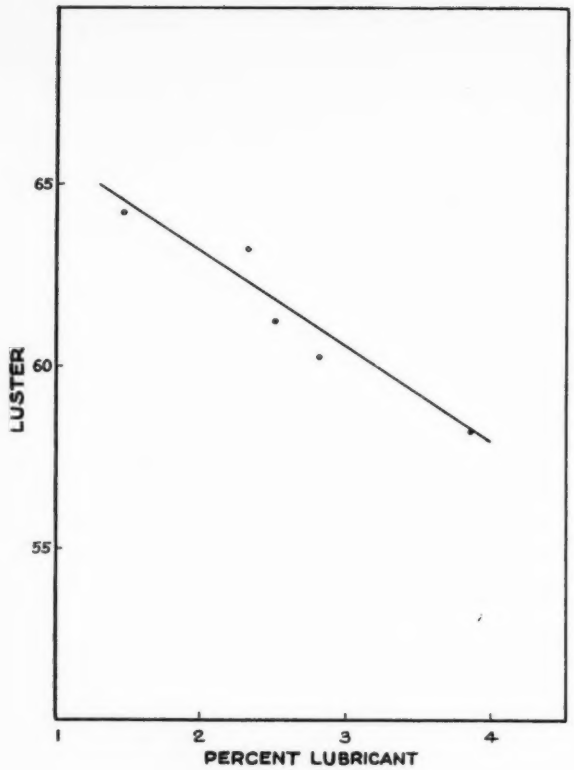


Figure 12

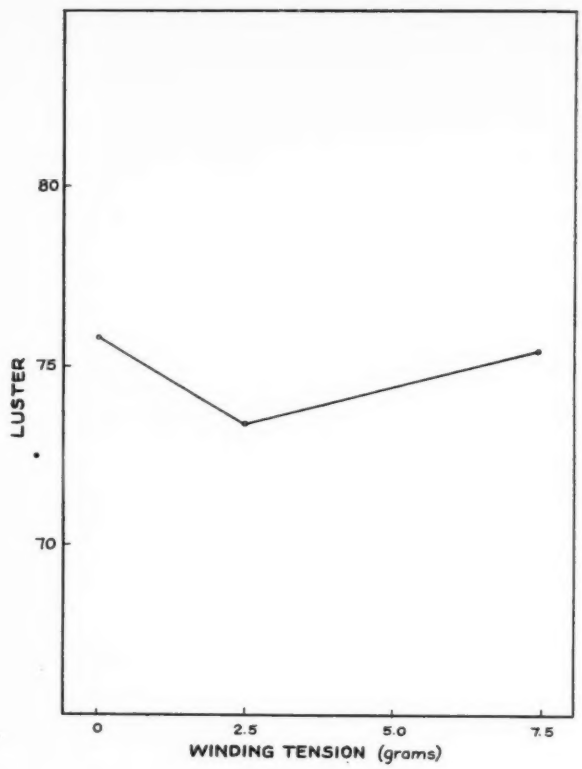


Figure 13

A small but definite decrease in luster with an increase in percent lubricant applied to the yarn is apparent from the chart. (This may not be true of all lubricants, and may show up to a lesser degree on dull yarns.)

LUSTER VS WINDING TENSION ———Fifteen bobbins each were prepared using No. 32, No. 16, and No. 23 travellers in order to get a wide range of windup tensions. No. 32 was the smallest size used and when winding 75 denier yarn, the tension was considered to be zero. With the No. 16 travellers, the tension was 7.5 grams. The third group was run at an average tension of about 2.5 grams. The plot on Figure 13 shows that no significant differences exist among yarns prepared over this range of winding tensions.

LUSTER DISTRIBUTION———As an example of the manner in which luster distribution is studied, a typical chart on 100 bobbins is shown in Table IV. The yarn is 75 denier and the statistical value is listed.

This chart individually is of less value than a group of charts of the same type, which may be used for comparison purposes. A distribution curve which deviates from the norm can be spotted instantly merely by glancing at the charts.

TABLE IV

Luster	Distribution				
52	1				1
53	1L				2
54	11				2
55	11111				5
56	11111	11111	11		12
57	11111	11111	1		11
58	11111	11111	11111	111	18
59	11111	11111	11111	111	18
60	11111	11111	11111	11	17
61	111				3
62	11111				5
63	1111				4
64	11				2

$\Sigma = 5843$

$\bar{X} = 58.4$

MAINTENANCE HISTORY

Over a period of 3½ years with 24-hour-a-day operation, the only maintenance required on the luster-meter has been replacement of one pilot light and one lamp, both of which were used throughout the experimental and developmental stage. It has been necessary on two occasions to clean the contact points on the lamp bases to reduce a fluctuation in contact resistance. Routine cleaning or replacement of the neutral density filter and resmoking the magnesium oxide standard have constituted the only other time spent servicing the unit.

CONCLUSIONS

From the foregoing group of tests utilizing the luster-meter, the following conclusions may be drawn:

1) The initial addition of small amounts of titanium dioxide causes a large decrease in luster; however, further addition of delusterant from 1% to 10% will decrease the luster only slightly.
2) Twisting the yarn reduces the luster linearly, but the decrease in luster for twisted bright yarn is much greater than that for dull.
3) Increased amounts of some yarn lubricants cause a decrease in luster.
4) Winding tensions at different levels have no significant effect on yarn luster.

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THE PRACTICAL ASPECTS OF NEUTRAL GREASE WOOL SCOURING

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The author discusses the technology of wool scouring and gives diagrams showing the various systems in operation. He furthermore traces the development of neutral wool scouring, which has become so popular in the last year. The qualities of nonionic synthetic detergents are emphasized and the effect of the chemical constitution of these materials in neutral scouring is explained. The paper is written from the point of view of the practical wool scourer and covers information concerning various types of recovery systems and the qualities of the resultant grease obtained.

INTRODUCTION

RAW wool scouring is the preliminary step in the processing of wool in which the impurities present in the fiber are removed by suitable physical and/or chemical means. The process is of paramount importance in the success of subsequent operations, such as carding, drawing, spinning, weaving, dyeing. etc. The nature and the quantity of the impurities in raw wool vary depending to a certain extent upon the breed of sheep or other akin, and the geographical, climatic or nutritional conditions under which it is raised. Generally speaking, the impurities may be classified into two broad categories: 1) acquired impurities, such as earth material, vegetable matter, faecal matter, tar, etc, and 2) the usual natural impurities secreted by the animal.

The natural impurities consist of two major components, namely wool suint and wool grease. Together, these two components are commonly known as wool yolk.

DISCUSSION

The removal of the abovementioned impurities from the wool fiber is accomplished in a series or train of treating tanks more commonly referred to as bowls. Opening machines and dusters arranged in tandem with the train gently separate the fibers and remove the bulk of acquired impurities, ie, grass, grit, sand, before the wool is dropped into the first bowl of the continuous train.

The rectangular-shaped bowls contain from 600—3000 gallons of solution and are equipped with rolls at the exit end in order to squeeze the wool and retain the impurities in the bowl rather than on the fiber. The wool is propelled by a reciprocating prong containing arms or rakes, which dip into the scouring system and move the wool from bowl to bowl through a series of squeeze rolls located at the exit of each bowl. The bowls are equipped with a perforated metal tray or false bottom located about one foot below the liquid level. These keep the wool at the surface within reach of the rakes and also allow heavy impurities to settle into the hopper-type sumps at the bottom of the bowls. (Figure 1).

Circulation of solution within each bowl is maintained by a tap in the overflow pan beneath the squeeze rolls. From here the solution is pumped back into the front or wool-entering end of the bowl where the circulation appears in the form of an intermittent spray.

Aqueous solutions are used universally as the scouring media although solvent systems have appeared commercially from time to time. In the aqueous process there are two basic systems, the emulsification process and the Duhamel or suint process.

In the emulsification process, soap or synthetic detergent and soda ash, added in varying amounts to all bowls except the final rinse bowl, perform the major scouring action. In the suint scouring process, the wool is first steeped in lukewarm water to dissolve the water-soluble suint salts. The following bowl or bowls perform the scouring action with the last bowl used as a warm-water rinse. It is possible to clarify the effluent from the suint solution and return it to the first two scouring bowls as an effective scouring medium. The suint salts are readily soluble in water and go into solution as ions. Ordinarily the suint salts tend to aggregate in water to some extent; the micelles that form consist of hydrocarbon tails oriented together and the hydrophilic heads, which form an interface at the water boundary. This small micelle formation is capable of solubilizing the water-insoluble wool grease in the hydrocarbon core when clarified and returned to the scouring bowls.

The Duhamel or suint process without detergent and alkali offers the advantage that the treatment is mild and does not damage the fibers, but the process does not reduce the grease content of the wool to a sufficiently low level and further recovery of the grease from the extraction liquor is difficult. Therefore, the most popular method is a modified suint-emulsification process. The suint operation is carried out in the first bowl, and the actual scouring, in the following bowls utilizing either soap or synthetic detergent and combinations thereof in high alkaline or relatively alkaline-free scouring solutions. The last bowl in all cases serves as a warm-water rinse. (Figure 2).

Until the early forties, the only detergents used in any appreciable quantity were the soaps of animal and vegetable origin in conjunction with an alkaline material, such as sodium carbonate (*1*). This so-called "soap and soda ash process" has many highly evident drawbacks regarding wool damage and scouring efficiency.

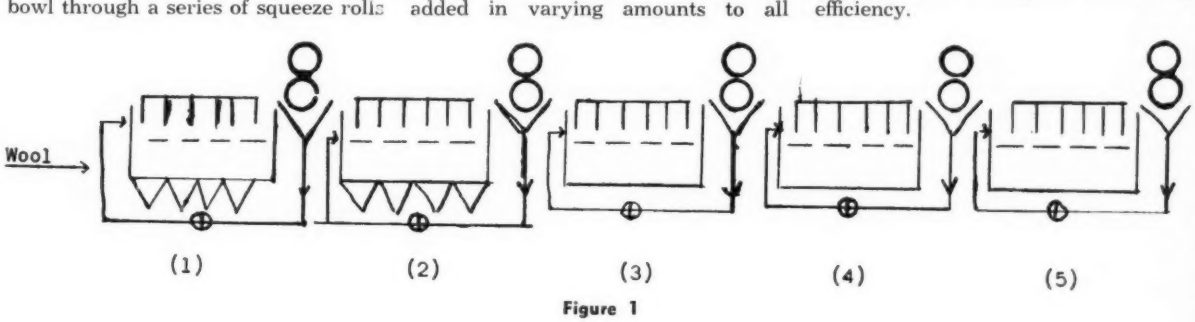

Figure 1

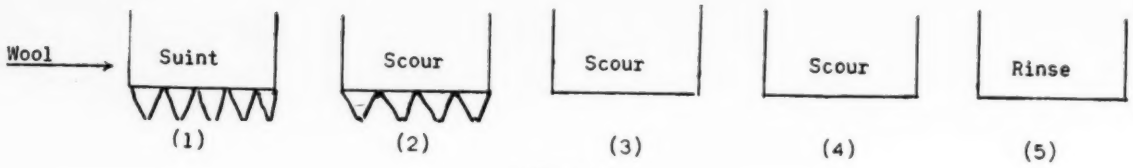

Figure 2

The introduction of synthetic detergents during the forties, notably the anionic types, was brought about by the scarcity of animal and vegetable fats used in the manufacture of soap. Although these anionic synthetic detergents tended to exhaust on wool in a fashion similar to soap, they provided the following advantages: 1) no rancidity if left on the wool, 2) free rinsing, 3) no lime soap formation, 4) reduced felting and 5) less alkali required. However, the anionic synthetic detergents showed no particular advantage over soap for emulsifying wool grease.

More recently, the nonionic-type synthetic detergents were offered as an improved replacement for the soap or anionic synthetic detergent component of the alkaline scouring system. These nonionics show superior emulsification over the anionics and in addition are absorbed to a lesser extent on the wool. The most prominent of these nonionics was of the alkyl phenol, ethylene oxide type.

In the late forties, there was an acute soda ash (sodium carbonate) shortage, which presented wool scourers a forced opportunity to investigate the neutral-scouring variations that had cropped up in Europe. Investigators who carried out neutral-scouring trials with either straight detergent or salt-and-detergent systems generally found, to their sorrow, that the economics were lacking, and they experienced difficulty controlling the scour in inadequate scouring systems specifically designed for alkaline conditions (*2*). However, the majority of wool scourers utilized caustic soda (sodium hydroxide) additions to soda ash (sodium carbonate) scouring baths, which converted the sodium bicarbonate form back to the soda ash, thus realizing a considerable savings on the actual consumption of alkali:

$$NaOH + NaHCO_3 \rightarrow Na_2CO_3 + H_2O$$

The caustic soda additions presented a problem in that the soda ash, normally added at the start of the scour and fed continously, reacts with the minute saponifiable portion of the wool grease to produce soap and sodium bicarbonate:

$$R\text{-}COOH + Na_2CO_3 \rightarrow R\text{-}COONa + NaHCO_3$$

The bicarbonate thus builds up constantly because it is not capable of saponifying the fats, and new soda ash must be added in proportion to the entrance of the raw shorn wool, otherwise breakdown of the scouring system occurs. However, the quantity of potentially saponifiable grease by soda ash in a scouring system is below 0.5%; therefore, no justification can be made for the exaggerated amounts of soda ash used. This breakdown of the scouring system is also obviated by the addition of caustic soda, although care should be taken that the bicarbonate is not fully neutralized, else the bath loses its buffering capacity and the pH may be increased above 11.0 until the wool fiber is drastically attacked.

The use of nonionic synthetic detergents in neutral scouring first became established on a large scale during the late forties, both in England and Canada. Use of the term "neutral" in this case indicates a pH of 7.0 and not what to the wool fiber is truly neutral because the isoelectric point of wool is between pH of 3.9 to 4.5. The first non-alkaline neutral scour utilized a nonionic synthetic detergent in conjunction with common salt (sodium chloride) at a pH of 7.5 to 8.5, which is truly characteristic of the wool-impurity type, and a scouring temperature of 160° F. The slightly alkaline pH of the scouring solution is derived from the alkaline suint salts contained on the wool and not by the chemical additions. Although numerous wool scourers in England and Canada were utilizing this high-temperature scouring system, they were not pleased to live with the high temperatures necessary with the syndet-salt scour. One can readily imagine the discomfort in working under conditions incurred by a poorly ventilated scouring department with five, ten or even twenty large, rectangular-shaped "bowls" full of scouring liquor at 160° F (*3*). Our company, at that time, was very reluctant to capitalize on any neutral-scouring system operating at the excessive temperature of 160° F in spite of its obvious merits.

Generally speaking, there were numerous modifications of a syndet-salt involving small additions of alkali. In themselves, they were modified versions of the conventional detergent-soda ash process (*4*). Such systems employed 1) sodium chloride or sodium sulfate; 2) sodium, potassium, etc, carbonates, polyphosphates, ammonia, etc; 3) a nonionic synthetic detergent in varying orders of magnitude. The sodium carbonate or other alkali was added to the first scouring bowl where the relatively high grease content of the wool protected the fiber from alkaline degradation. Sodium chloride or other electrolytes were added to the subsequent scouring bowls along with the synthetic detergent. This complex system not only introduced the danger of fiber degradation, but also required close and critical supervision of detergent and electrolyte additions with specific emphasis on the manner of counterflowing the scouring liquor. Supplementing this type of scour, were other systems combining aliphatic and/or aromatic hydrocarbons (Figure 3).

It is readily acknowledged that a true neutral-scouring system operating within the isoelectric range of

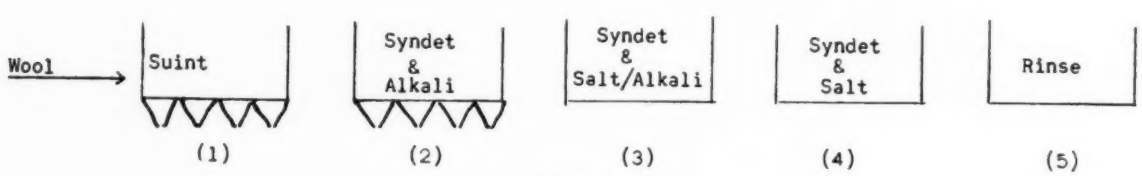

Figure 3

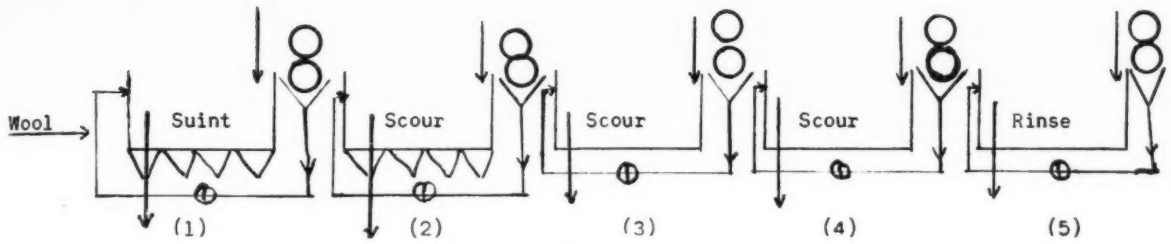

Figure 4

wool, which functions at a pH of 4.0 to 4.5, would provide the maximum amount of fiber protection. But such a scour has the major drawback of giving severe corrosion because of the necessity of using it in conjunction with acids.

In the early fifties, during a prolonged plant scouring trial, it was found that a straight nonionic synthetic detergent, utilized in a counterflow system at scouring temperatures of 140-145° F, was equal or superior in grease and dirt removal to a nonionic detergent—common salt scour at the elevated 160° F. We further proved that a neutral nonionic at 140-145° F possessed superior emulsifying and suspending properties compared with soap and soda ash at 125° F.

The excellent scouring efficiency of this nonionic at 140-145° F received wide acclaim in the United States when it was made evident that such a system could provide an economic scour, easily controllable, which sharply minimized physical degradation of the wool fiber along with the elimination of the objectionable 160 F temperatures. Such a system provided a better appearing and generally all-around superior clean wool with less neps and noilage than that obtained with any alkaline system present or past. Furthermore, the addition of sodium chloride or sodium sulfate to this nonionic was of little value on shorn wools, provided a temperature of 140° F was used.

A neutral-scouring system employing a 100%-active, nonionic surfactant, such as Lavepon, may be operated effectively below 140° F, it being understood, of course, that the economy is inversely proportional to the temperature below 140° F. The addition of neutral electrolytes to so-called low temperature scouring systems below 140° F has little or no practical value provided the specific nonionic detergent used is within a certain molecular weight range and meets specific hydrophobic/hydrophilic ratio requirements.

For a given amount of nonionic detergent, there is a marked decrease in scouring efficiency below 140° F. Above 145° F there is no improvement and working conditions in the scouring room become disagreeable.

COUNTERFLOWING —— Wool scouring concerns within the United States believed, and some continue to believe, that with an alkaline scour it is economically advantageous to operate the scouring bowls within the train as independent units. In this manner, the intermittent drainage of these independent bowls provides a minimum waste of chemicals by maintaining the desired total alkalinity within specific bowls. (Figure 4).

The alkaline scouring of grease wool in a counterflow liquor system has proved to be very uneconomical and a waste of chemicals unless the spent liquor is filtered or centrifuged and returned to the train for re-use.

Our neighbors across the Atlantic had accepted universally the counterflow system of alkaline scouring prior to the recent advent of neutral scouring, the reason being that they are more cognizant of scouring quality and ease of control rather than the economic feasibility of independent bowls for the alkaline process.

Figure 5 depicts fresh, preferably warm water entering the rinse bowl in sufficient quantity to offset the liquor depletion, moving in a counter-direction to that of the wool, flowing back through and out the first scouring bowl.

It is established practice for mills that recover grease to utilize the first bowl as a warm-water "suint" at 80-90° F, thereby removing the grit and troublesome inorganic salts (predominately potassium derivatives), which, although enhancing the emulsion stability, provide a deleterious effect on centrifugal grease-recovery efficiency and grease color.

This counterflow method of alkaline scouring has been established within recent years in many American mills through the perseverance of the centrifuge manufacturers along with the chemical suppliers. In fact, American Chemical Paint Co holds patents covering an alkaline scour in which the counterflowed liquor is drained from the first scouring bowl and centrifuged after which the spent centrifuged effluent is then returned to the last scouring bowl (5). This constitutes a "closed system of scouring" whereby the spent centrifuged effluent containing upwards of 1.5% grease in emulsion form and rich in total alkalinity is reused very economically. On the other hand, with a nonionic scouring system, it is mandatory to use a satisfactory counterflow system so as to preserve the economics and controllability of the wool scour. The nonionic detergents have been found to provide a most suitable and economical scour at tem-

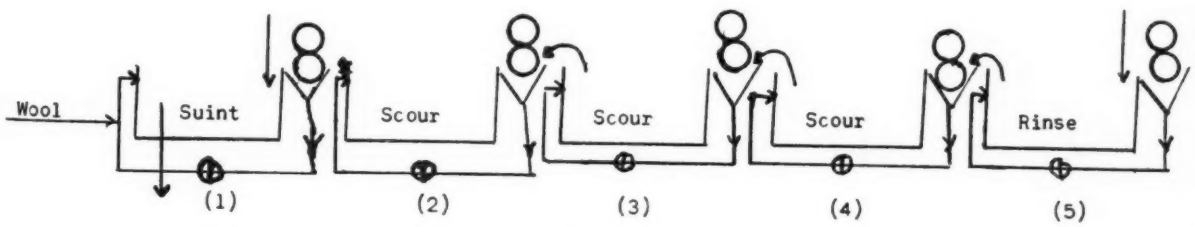

Figure 5

peratures of 140-145° F excluding the presence of external electrolytes, such as sodium chloride (common salt), sodium sulfate (Glauber's salt), etc. The choice of scouring temperature and economics of initially charging and systematically feeding the nonionic surfactant will be wholly dependent upon the manner and nature of the counterflow. The counterflow water entering the rinse bowl may be controlled automatically with succeeding adjustments on 1) the gravity-flowed weir boxes, and 2) the pump-operated flow back, generally emerging as a spray at the front of the bowl.

The grease-dirt emulsion formed by the neutral nonionic is of poorer stability and durability than that obtained with soap and detergent under alkaline conditions; hence, the necessity for a proper counterflow temperature factor to reduce or maintain an optimum grease-dirt emulsion.

The addition of a nonionic of the Lavepon type alone to the scouring bowls renders the emulsion much clearer than when soda ash is used. One may get the impression that the soda ash is scouring much better because the impurities appear to be in the bath. Actually, what occurs is that the nonionic scour requires a longer counterflow time-volume factor for the interchange of the clean and dirty liquors. Therefore, the wool leaves the bowls carrying away emulsified grease, which is deposited in the succeeding bowl. Actual samples of the wool leaving the first scouring bowl showed 4.2% residual grease, but when it was rinsed, showed 0.8%. The wool before scouring contained 11% residual grease. An alkaline (soda ash)-scoured sample leaving the first scouring bowl showed 2.6% residual grease, and only 1.2% following the rinse.

This clearly indicates that the alkaline scour takes away grease quicker and removes the "easy" portions more quickly. However, the alkaline scour is not as effective in removing the later and most difficult fraction of the grease below a critical grease-content level. This level is brought about by the danger of adding or maintaining high alkaline conditions in the last bowl or bowls of the scouring train. That is, an unprotected wool fiber in the presence of alkali causes the fiber to absorb the alkali, with accompanying swelling and cleavage of the sulfide linkage of the keratin portion of the wool upon concentration of the consumed alkali during the drying operation. This degradation is readily evidenced by: 1) the fact that the increased drying time or temperature necessary for alkaline scoured wool is greater than for neutral scoured wool indicative of a greater swelling action, and 2) the embrittlement of the alkaline wool fiber in drying, followed by physical breaking of the fibers during the carding operation. This physical breaking of the alkaline wool fibers in carding can be seen as "fly" or a heavy mist of broken short fibers in the air surrounding the card. This "fly," as it is commonly referred to, is absent in the carding of neutral scoured wool stock, which in itself is indicative of the maintainance of the overall fiber length with accompanying less noils and neps.

EXPERIMENTATION ——— The method employed above to demonstrate individual bowl scouring efficiency involves the determination of greases on a random sample of wool leaving the bowl in question. In this manner, knowing the original grease content of the unscoured wool, one can readily determine the percentage of grease removed in each scouring bowl, and hence, the scouring efficiency. It is customary for grease extraction tests to be run regularly on the scoured, dried wool. This is done for two reasons: 1) to determine the overall scouring efficiency, and 2) to maintain a desired level of grease on the wool for satisfactory carding and combing.

When the grease content of the scoured wool exceeds a predetermined limit, it is customary to make an "emergency" addition of synthetic detergent to supplement the regular detergent feed. The choice of bowls where this emergency add is to be made is governed solely from past experience. The random examination of individual bowl scouring efficiency will more accurately and quickly determine the troublesome bowl and to what degree the scour has fallen off.

A slackening of scouring efficiency may be caused by inadequate counterflow or detergent feed, temperature variations, varying greasy content of wools, or combinations thereof.

The difficulty in a nonionic neutral scour, as previously stated, is the control of the counterflow so that the emulsified grease cannot enter the rinse bowl. Accumulations in the rinse bowl would cause redeposition on the wool. In addition, by concentrating the nonionic additions near the rinse bowl with a counterflow system, the nonionic detergent is utilized many times over and a longer contact time is obtained for a given amount of wool and nonionic detergent.

RECOVERY OF WOOL GREASE ———The wool grease itself is a complex water-insoluble mixture of fats and oils secreted by the sebaceous glands of the sheep. The term "wool grease" is a misnomer as the product actually is a wax, the ester of a high molecular weight monohydric alcohol and a fatty acid. The purpose of this paper is far removed from any attempt to introduce "wax" into recovery terminology. The component wool wax alcohols are: 1) aliphatic alcohols; 2) the sterols, principally cholestrol; and 3) the triterpene-like alcohols, principally lanosterol and agnosterol. The component wool wax acids consist of four major series: 1) iso-acids, 2) branched chain acids, 3) hydroxyl acids, and 4) the normal fatty acids.

There have been, and continue to be, introduced new and/or more refined procedures for the recovery of wool grease from wool-scouring effluent. Many of these methods were instigated originally by the continual research designed to improve scouring systems. It would require several pages to list and describe all of these inventions and adaptations; therefore, let us briefly discuss the majority of the commercially accepted recovery systems.

Acid Cracking Process (Magna Process)

A chemical process in which the scouring emulsion is cracked or broken. Generally, it calls for adding sulfuric acid and allowing the grease and sludge to settle out, then separating by filtering under heat and pressure. Strictly speaking, this process is not a grease recovery process at all, since its primary function is to bring waste scouring liquors to a condition meeting local stream and sewerage requirements. The acidulation of the grease emulsion produces a foul smelling, brownish-black acid degras. It affords approximately 80% removal of the original grease containing emulsion. The only outlet for this low grade grease is the tanneries where it is used for dressing leather, etc.

Aeration Process (Battage Process)

A mechanical process utilizing the principal of foaming the grease emulsion by blowing pressured air up through the emulsion until the grease is concentrated at the top in the form of a froth. The grease-containing froth is recovered by skimming, then washed and dried. Percentage of grease recovered is of the same magnitude as in the Centrifugal Process.

Solvent Process

A chemical process adaptable where the solvent process of scouring is used. It essentially involves the filtering out of the solid impurities in the grease-solvent solution with a

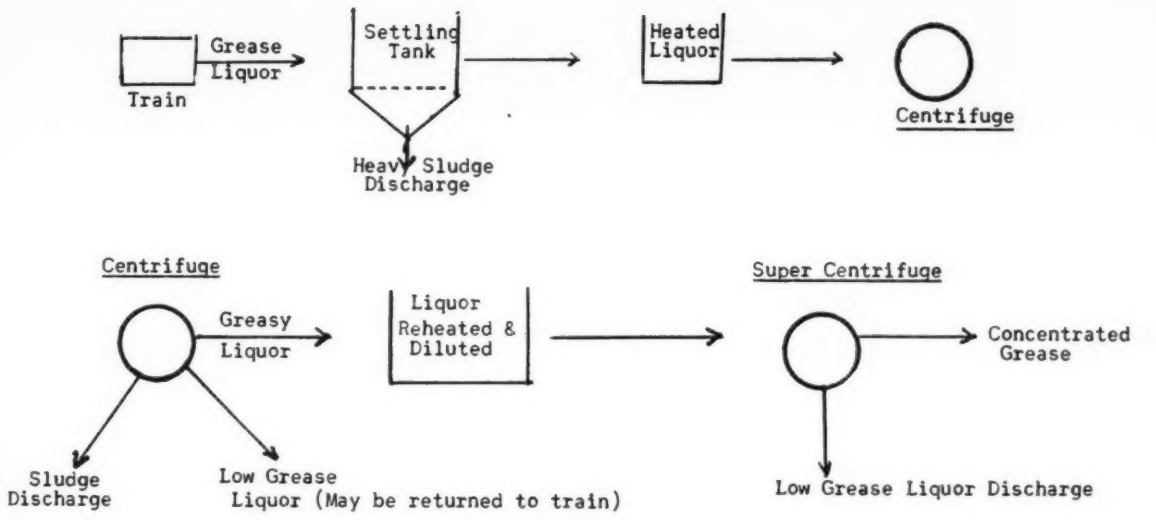

Figure 6

subsequent distillation of the solvent in question. Nearly all of the grease present in the solvent (naphtha, etc) can be recovered. The quality of the brown-colored grease obtained by this method is inferior even to that obtained by the Acid Cracking Process.

Centrifugal Process

This is, by and large, the most popular method for recovery of wool grease. It is apparent that the thirty-odd mills in the United States which recover grease by centrifugal means do so for one or both of two reasons. 1) In spite of the high initial cost of investment of a centrifugal grease-recovery system, the continuous operation of a grease-recovery system with succeeding grease sales generally pays for a good portion, if not all, of the mills' scouring costs. 2) A secondary consideration would be the minimizing of potential or present stream-sanitation costs to meet requirements, which are more or less dependent upon geographical location.

The centrifugal method of grease recovery is essentially a mechanical process. The grease-containing scouring effluent is pumped to adjoining, large settling tanks with hopper-type sumps, where it is stored for a predetermined period prior to passage through the centrifuge or centrifuges, from which it emerges as saleable wool grease (*6*). An alternate procedure excludes the settling period and operates fundamentally as the previously described closed system of scouring.

During the course of the settling period, the gravitational effect is sufficient to precipitate much of the large-size, solid impurities, which are intermittently discharged from the hopper-type sumps. The wool grease, on the other hand, separates to a certain degree from the scouring effluent emulsion and concentrates at the maximum liquor level. The degree of intensity of wool grease concentrated in this fashion is a direct function of the scouring emulsion present with regard to time, temperature and emulsifier concentration. It is possible to take advantage of the chemical composition of the scouring agent or agents employed and further enhance this wool grease isolation at this stage by utilizing temperature alone or in combination with external chemical additives, which may act in two ways: 1) a physical "salting out" or dehydration effect of the scouring agent contained in the scouring liquor, or 2) chemical modification of the scouring agent and/or the wool grease with resultant separation of the grease from the emulsion.

The nonionic synthetic detergents of the alkyl aryl polyether alcohol type similar to Lavepon are occupying a more prominent place in grease-wool scouring. The water solubility and surface activity of these nonionics are dependent on the hydrophilic nature of the ether linkages of the polyoxyethylene chain. The forces of hydration are reduced by increasing temperature, insolubilizing the nonionic. Therefore it is theoretically possible to "break" the settling scouring emulsion by simply raising the temperature to a point where dehydration of the ether linkage of the particular nonionic occurs with accompanying separation of the grease phase. Unfortunately, the temperature per volume factor necessary to separate the grease presently is impractical and uneconomical. An alternate proposal is to chemically dehydrate the nonionic with appropriate dehydrating agents.

The partial separation or reduction of emulsion stability in the settling tank predicts a high degree of wool grease separation in the succeeding centrifuge operation.

It has been established that the color of the wool grease obtained is adversely affected by a prolonged settling period, which is normally beneficial in increasing the wool grease yield within a certain time factor. Alkaline-containing scouring liquors held over forty-eight hours apparently generate additional emulsion stability evidenced by a lower than normal grease yield.

One wool scourer in the United States has a patented process utilizing the above principal, wherein two separate grease fractions are obtained (*7*). The first fraction, obtained by centrifuging fresh scouring effluent, is characterized by extremely good color, but the recovery yield is low. The remainder of the spent centrifuged liquor along with new scouring liquors low in grease content are subjected to a high-temperature settling action in the presence of suitable ionizable salts. This second grease fraction is much darker in color; however, it augments the yield of the initial fraction to provide an exceptionally high grease-recovery efficiency.

Many mills that centrifugally recover wool grease have neither continuous or ample volume of dischargeable liquor to effectively operate the centrifuge at optimum efficiency. Therefore a backlog of scouring liquor is constantly maintained in the storage or settling tanks. Another purpose served by this settling period is the reduction of the solid impurities high in abrasive content, insuring successful operation of the centrifuge without too frequent shutdowns for cleaning and minor repairs. (Figure 6).

The wool-grease-containing liquor in the settling tank is withdrawn from a point at or near the top liquor level at which the concentration therein of wool grease is relatively high and the insoluble impurities are low.

The withdrawn liquor is transferred to an intermediate tank, wherein the liquor is heated to temperatures below the boiling point of water, and is then passed through the centrifuge. In the centrifuge, the grease-and-dirt-containing liquor is separated into three distinct fractions by centrifical force in excess of 3000 times the force of gravity. The first is predominantly a heavy concentration of solid impurities, generally referred to as sludge, which is immediately discarded. The second fraction, containing two thirds of the withdrawn liquor, is comprised of less than half of the soluble suint salts removed from the wool in addition to a maximum of one percent wool grease. This portion may either be discarded or returned to the train as in a closed system of scouring. The final fraction contains the remainder of the aqueous phase, soluble salts and the bulk of the wool grease. This fraction is diluted with many times its volume of fresh water, again heated to temperatures below the boiling point, and passed through a very-high-speed centrifuge operating in excess of 10,000 times the force of gravity. The wool grease discharged is essentially a "dry" grease containing approximately one percent of water. The wool grease in this state is sold to the wool-grease refiners, who in turn further process it for a diversity of end uses. The bulk of the refined wool grease is sold to the cosmetic and petroleum industries (*8*).

CONCLUSION

The price offered for wool grease is normally based on the color and texture of the grease as well as the current market demand.

Prior to the advent of the nonionic neutral scour, the grease refiners had established processes for treating raw wool grease. The bulk (80%) of this grease had been recovered from alkaline scouring liquors. All the refiners used fundamentally the same process for upgrading the grease. The balance was acid degras produced by mills using an acid cracking process. This quality is a regular raw material for the leather tanning industry.

The introduction of neutral wool grease on the market required that the refiners devise new or modified processing techniques because, in neutral wool scouring, the improved fiber whiteness of the wool itself is achieved at a sacrifice in the color of the grease. A greenish color from a substance not yet specifically identified is solely responsible for the higher grease color. This color is removed from the wool and remains in the grease and not in the water.

The additions of alkali to the neutral scour itself will enhance the grease color but again at a sacrifice in fiber quality and whiteness. We have refrained from recommending alkali additions to the scouring train because of the danger of fiber damage. There are on the market today many compounded detergents containing alkali that will, at best, produce a compromise in the color and quality of the wool fiber and grease, but generally at an increase in chemical costs.

On the other hand, it has been definitely established that it has not been too impractical for a scouring plant to make chemical additions to the effluent in an attempt to produce lighter-colored greases without effecting the fiber quality.

SUMMARY

Millions of pounds of grease wool are annually scoured with synthetic detergents in the absence of alkali. Wool cleansed in this manner possesses superior whiteness, loft and general fiber quality as compared to wool cleansed in alkaline-containing scouring solutions. The neutral method of scouring utilizes the conventional scouring equipment with minor adjustments in regards to temperature and flow back system.

The flow back of scouring liquor contrary to the movement of the wool in the scouring train is the key to the success of the neutral system. Temperature is fundamentally a question of economics.

The color of the wool grease centrifugally recovered from neutral scouring liquors is admittedly darker in color than that obtained from alkaline liquors. However, there are processing methods which will materially improve the color. The refiners of wool grease have overcome their initial difficulties encountered with neutral wool greases.

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(*5*) U S Pat 2,183,142, "Method of Cleaning Wool", assigned to American Chemical Paint Co.

(*6*) U S Pat 1,920,469, "Wool Scouring", assigned to the Sharples Corp.

(*7*) U S Pat 2,692,184, "Scouring of Wool and Recovery of Wool Grease from Wool Scouring Liquor", assigned to Pacific Mills.

(*8*) U S Pat 2,417,329, "Method of Refining Crude Wool Grease", assigned to American Chemical Paint Co.

• PATENT DIGEST •

PAUL WENGRAF

DIAZOAMINO COMPOUNDS PLUS NAPHTHOLS Developed with Dichloro Adipic Acid D,2,04

US Pat 2,786,731 (Cassella Farbwerke—Riedmair, Rein, Kerth—March 26, 1957).

Combinations of stabilized diazoamino compounds and coupling agents are known in the trade as Diagens, Rapidogens, Pharmasols, etc.

These products, widely used in printing and dyeing practice, were applied originally from alkaline media and developed to the final color by acid treatments, eg, exposing the goods to acid steam. In order to avoid corrosion of equipment, however, it was later suggested that this acid-vapor treatment be replaced, by a procedure in which halogenated fatty acid salts, eg, sodium monochloroacetate, are added to the print paste to split off acid during the normal steaming process (Brit Pat 454,869—Du Pont, 1936). It is reported, however, that these agents did not work quite satisfactorily either by reason of the prolonged steaming required or because of too-quick cleavage, which rendered the paste unstable.

Surprisingly, printing pastes containing dyestuffs of the aforementioned classes, to which α—α'-dichloroadipic acid salts or other derivatives of the acid (eg, esters) were added, were found to be perfectly

stable at room temperature; intense and pure shades were developed with neutral steam.

Example: An equilolecular mixture containing 1-acetacetyl-amino-4-Cl-2-5-dimethoxybenzene as the coupling agent and diazotized 5-Cl-Cl-2-amino-1-methylbenzene and methyl amino ethane sulfonate (probably a dyestuff similar to Rapidogen Yellow I4G) as the diazo-amino compound was made into a paste with urea, alcohol, caustic soda and water. It was then stirred into a neutral starch-tragacanth thickener, in which *a-a'*-dichloroadipic acid, neutralized with NaOH, had been dissolved. After being printed, dried and aged in neutral steam for 5 minutes, a clear, yellow print emerged. In contrast, a print produced from a paste containing an equivalent amount of sodium monochloroacetate, did not offer the same depth of shade after 20 minutes steaming.

Among the references cited by the Patent Office:

USPat 2,088.506 (Du Pont/1937, parallel to Brit Pat 454,869, quoted in the current specification): developing agents for the above dyestuff class are (preferably) sodium monochloroacetate, also esters of polyalcohols, acid amides, triethanolamine salts and sulfophenyl alkylchloride.

DIRECT DYEINGS METALLIZED in Baths Containing Polyphosphoric Acid C,4,01

US Pat 2,785,040 (Ciba Ltd—Gross, Menzi, and Wegmann—March 12, 1957).

This patent covers a process for the dyeing of cellulosic materials with metallizable direct dyestuffs, which form sparingly soluble Cu or Ni complexes, by the addition of an agent yielding metal (eg, Cu or Ni) to a bath containing at least a small quantity of nonmetalized dyestuff.

The process comprises adding to the dyebath an agent yielding a metal having an atomic number from 28 to 29 and carrying out the metallization in a neutral-to-alkaline medium in the presence of anions of a polyphosphoric acid and in the absence of amines. It is possible to add an alkalipolyphosphate, eg, tetrasodium pyrophosphate . . . $Na_4P_2O_7 \cdot 10\ H_2O$ . . ., and a simple soluble metal salt (Ni- or Cu-sulfate) separately to the dyebath, or to use a complex polyphosphate, such as sodium-copper-pyrophosphate . . . $3Na_4P_2O_7 \cdot Cu_2P_2O_7$, as the metal-yielding agent. In the former case, the metal salt must not be added to the dyebath before the alkalipolyphosphate is introduced. Otherwise, the dyeing process is carried out as a standard direct dyeing.

In the dyeing of cellulosic materials with direct dyes, some unused dye generally remains in the dyebath. At this stage the metallization may be carried out, ie, the copper-yielding agent may be added, to bring about the effect of improved light- and washfastness. In contrast to known metallizing processes where tartaric or other hydroxy acids are used it is possible to add the metallizing compound even before the greater part of the dye has been adsorbed by the fiber.

Example: A metallizable blue, direct tetrazo dye was pasted with alkali and dissolved at about 60° C in the dyebath. A 10% solution of sodium-copper-pyrophosphate was added and a cotton fabric dyed in this bath, which was raised to the boil and kept boiling for another 45 minutes while cryst sodium sulfate was added gradually. This dyebath was bound to be well exhausted. A deep, blue dyeing having good light- and washfastness was obtained. Similar good results were observed when the metal-alkali-pyrophosphate was added during the dyeing procedure or at the end of exhaustion or when copper sulfate and sodium pyrophosphate were added to the bath separately.

Among the references cited by the Patent Office:

USPat 2,148,659 (Ciba/1939): dyeing with metallizable direct dyes that give sparingly soluble metal compounds, followed by an aftertreatment in the same dyebath with the corresponding metal salts applied in complex form.

USPat 2,243,020 (Ciba/1941): dyeing with direct metallizable dyestuffs of the above type, applying the metal-yielding agent (copper) in the form of alkali-stable complexes obtained by mixing the metal salts with organic hydroxy acids, eg, lactic or glycolic acids.

Munter, C J, and Bell, E B, "Some Applications of Sodium Metaphosphate," *Am Dyestuff Reptr* 24, No. 2, 40 (Jan 28, 1935): general applications of sodium metaphosphate are discussed, among them, a dyeing procedure in which harmful scum formation is avoided.

Abstracts

Textile Applications of Fluid Beds

Audas, F G, *Textile Recorder* **75**, 57-60, August, 1957

Many textile processes, particularly in dyeing and finishing, involve the heating of yarns or fabrics. The method normally adopted consists of bringing the material into contact with hot air or running it over heated an aggregation of small particles, such as sand or spherical glass beads, contained within a suitable chamber. A stream of gas or liquid is passed upward through it, and when the upward pressure exerted on the particles by the stream is sufficient to keep them in suspension, the bed becomes fluidized, and the particles act in drums, plates or cylinders. Both of these methods are inefficient as means of securing the necessary heat transfer, and during a search for improvements the British Ravon Research Association conceived the idea of adapting fluid beds, which were already known in other fields, to textiles.

A fluid bed consists essentially of much the same way as a liquid. The bed introduced by the BRRA for textile processing uses air as the fluidizing medium.

A typical full-scale unit consists essentially of a fluid bed of sand 6 ft deep by 6 ft wide and approximately 18 in from front to back. At the bottom of the bed a partition of porous ceramic tiles is provided to ensure an even distribution of the air which is fed from an air box beneath this partition. A few inches above the tiles, a porous ceramic roller mounted on a hollow shaft and provided with a separate air supply is also provided.

Wet cloth enters at the top and passes vertically downwards and around the roller at the bottom, returns upwards and leaves the system at the top as dried cloth.

The sand is heated by tubes running horizontally across the bed. Either ignited gas or steam may be used for heating. A temperature of 150° C is recommended.

Using fluid beds, Terylene, nylon, and acetate may be rapidly dyed with acetate dyes to deep shades within a few seconds, according to the author. Azoic dyes may also be applied to these fabrics by this means under

conditions sufficiently rapid to make continuous processing attractive. Procion dyes are particularly suited to fixation by means of fluid bed heating.

The application of acetate (disperse) dyes may be carried out simply by padding the fabric with a dispersion of a dye, and after mangling, subjecting the material to the heat treatment in the fluid bed, where drying and dye fixation take place.

The author gives much additional information on the process, and describes its application in the dyeing of Azoic and Procion dyes also. He states that it may be used for pigment padding, as well as for the crease-proofing of rayon with urea-formaldehyde.—WHC

New and Durable Antistatic Finishes

Valko, E I and Tesoro, G C, *Modern Textiles* **38**, 62-70, July, 1957

The synthetic fibers (nylon, the acrylics, the polyesters, etc.) all have one shortcoming: the tendency to accumulate electrical charges. This tendency is higher in the synthetics than in the natural fibers because their electrical conductivity is lower, ie, their resistivity is higher. This, in turn, is due to the fact that the moisture regain of synthetic fibers is lower than that of natural fibers; in other words, natural fibers are more hygroscopic. When bone-dry, however, natural fibers are also poor conductors.

In order to eliminate the tendency of synthetic fibers to accumulate electric charges, two ways seem open: either their tendency to generate charges must be suppressed, or their tendency to hold the charges must be reduced (ie, by coating the fibers with a layer of conductant material). To be useful as a durable antistatic finish, such material must be insoluble and able to withstand repeated launderings and drycleanings. It must not discolor the fabric or impart an undesirable hand. Also, it must not be too expensive or require an impractical application process.

To fulfill these requirements the authors have developed two products, Aston LT and Aston 108. These are water-soluble polymers, applied from an aqueous solution with a curing agent or catalyst which cross-links and renders insoluble the soluble polymer during curing. The cured compounds are stated to be nitrogenous anion exchange resins.

The authors state that the durability of these finishes to washing far exceeds that of any other known chemical finish for textiles.

While there is probably no chemical interaction between the antistatic finish and the fiber, the nature of the fiber has a very definite effect on the durability of the resin. Some antistatic finishes are durable on Dacron and not on nylon; others are durable only on acrylic fibers. Aston LT is said to be effective on all synthetic fibers, but is more durable on Orlon than on Dacron, and still less durable on nylon.

The effect of fabric construction on durability is extremely important. Woven fabrics give better results than knitted fabrics, and spun fabrics give better results than filament fabrics.

The authors describe the antistatic effect of the Astons on various types of fabrics; eg, when they are applied to blends of 65% Dacron and 35% spun rayon, which normally show high electrical resistance, the resistance is reduced below the level of untreated cotton or rayon.

The authors tested the effect of Astons LT and 108 on the lightfastness of dyes, the tensile and tear strength and flammability of treated fabrics, etc. No unfavorable results were obtained, they state, except a slight decrease in tensile and tear strength in some cases.—WHC

Man-made Fibers in the Medical World

Anon, *Man-made Textiles* **34**, 40-1, July, 1957

The merits of Fibro viscose rayon staple for a wide range of textiles for hospitals are generally accepted. Its use, not only in uniforms, sheets and blankets but also in surgical dressings, has steadily increased in the past few years.

The fiber is now finding application in bandages, gauze, lint and "cotton-wool." It has been found that rayon gauze does not adhere to the surface of wounds to the same degree as all-cotton; it is therefore more easily removed, and because of its inherent softness, is less of an irritant.

Lint made from 100 percent spun rayon is similar in appearance and behavior to cotton lint, but in many respects is actually superior, being softer, kinder to the wound, and more pliable.

There is an increasing use of Fibro yarns in bandages of various types. One recent development is the use of bandages made of spun-dyed yarn in conspicous colors, or if necessary in flesh pink, for use in industry. These have the great advantage that there is no danger of the dye "bleeding" into a wound.

Support bandages, made from a combination of spun rayon and elastic, combine the advantages of firmness, lightness and comfort with true elasticity.

Blends of Fibro and cotton in various proportions are being used for nurses' uniforms, doctors' gowns, and overalls for laboratory assistants, as well as for sheetings and towels. Blankets are made from a blend of Fibro and wool in both warp and filling.

The alginate fiber, made from seaweed, and described as "a natural haemostat", is used in surgery, combined with medical lint, for first-aid purposes. It provides a styptic agent to arrest bleeding and assist the healing process.

Courlene (Courtaulds' polyethylene yarn), in the form of surgical tubes, is offered as a replacement for diseased or injured arteries.

Finally, Courlose, sodium carboxymethylcellulose, has pharmaceutical and medical uses in antibiotic suspensions, haemostatic dressings, and as a disintegrator for tablets.

The firm of Courtaulds Ltd displayed samples of these new developments at an exhibition in Manchester, England last summer.—WHC

Sequestering Agents, with Special Reference to Dyeing

Pitts, L, *Dyer* **118**, 260, Aug 16, 1957

The application of sequestering agents, although by no means a modern innovation, has nevertheless only received its rightful place in the elimination of metal ion contamination during the last few years. The author states that this is due almost entirely to the arrival on the scene of sequestering agents based on ethylenediamine tetraacetic acid (EDTA).

The uses of EDTA in scouring, kier-boiling and peroxide bleaching are first briefly discussed.

It has long been known that traces of iron, copper, calcium, magnesium, aluminum, etc, in a dyebath may have an adverse affect on the shade, making it dull and off-tone. The color yield and fastness to rubbing may also be affected. The chrome dyes in particular are susceptible to this fault, the contaminating metal ions forming dye/metal complexes different in shade and fastness from the dye/chromium complex. Insoluble dye salts or lakes are also formed with certain dyes, giving precipitation of the dye on the surface of the fiber.

To avoid these faults, sequestering agents are the natural additives, but certain precautions have to be taken in the case of premetallized dyes when EDTA is used. If the metallized dye and EDTA are in the same bath, and if the EDTA/metal complex is stronger than the dye/metal complex, the dye will be demetallized. This is particularly true of the acid-dyeing metal complex dyes (eg, Neolan dyes). When it is necessary to use EDTA with one of these dyes, it

(*Concluded on page 748*)

Proceedings of the
American Association of Textile Chemists and Colorists

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October 7, 1957

Joint Meeting
Delaware Valley and New York Sections——

ADDRESS BY THE PRESIDENT*

GEORGE O LINBERG

THE Sections of the Central Atlantic Region are to be congratulated for putting on this joint meeting. The members of the New York, Delaware Valley, Hudson-Mohawk and Niagara Frontier Sections represent nearly forty percent of AATCC's membership. What this group does has an important bearing on the shape of things to come in formulating policy and program for our Association. This meeting is a splendid example of constructive thinking and planning.

I want to take advantage of the opportunity I have tonight to present to you, for your consideration, a few observations and ideas which might come under the heading of a public relations program for AATCC members.

We are an Association of some 7,000, scattered throughout the United States in the major cities and in the small communities. We work for companies of all sizes whose business touches on practically every phase of the textile industry. We, as an Association, have a ready-made organization waiting to be fully mobilized to carry forward the aims and objectives of our society, and at the same time, make our influence felt on many fronts where we are hardly known.

Our Association has its national body consisting of its Council, its officers, its national committees and its national headquarters. There are four Regions made up of fourteen Sections, each with its governing body, officers, committees and members. Each member is an important spokesman for AATCC in his company and in his community. In his own right, he represents the AATCC—what it stands for and what it is trying to do.

I think all our members know what we stand for, otherwise they wouldn't be members. But what about our program and our aims? These I would like to outline briefly as I see them, and then ask you, as members of the Sections of the Central Atlantic Region, to take the lead in setting a pattern for the Association as a whole.

Let me break the program down into four major areas: *first*, our place in the nation's business community; *second*, our role in the textile industry; *third*, our responsibilities to the scientists and technicians in our industry; and *fourth*, our obligations to the youngsters who have potential careers in our industry.

I have a few suggestions as to what each of you as individuals can do to strengthen our Association.

Not only do we clothe the nation and at the same time provide fabrics for home and personal use, but thirty percent of our textiles are absorbed in industrial usage. We are an important part of the industrial as well as the commercial economy. *The New York Times* has reported that two billion pounds of fabric annually go into heavy duty products. In the rubber industry, for example, for every three pounds of rubber used, one pound of textiles is processed. Let us not lose sight of new opportunities to compete for new applications in textiles in the industrial as well as the consumer markets. In our Association, we have been alert to such problems as drip-dry and wash-and-wear. Have we been equally alert to industrial end-use performance? Perhaps we should broaden our thinking and take a hard long look at our relations with other industries to see just where we stand in the country's economic neighborhood.

We in textile chemistry, dyestuffs and finishes, whether we are suppliers, or users, occupy a particularly sensitive and vulnerable position. The AATCC has probably been responsible, more than any other single force for enabling the textile industry to maintain orderly technical housekeeping through AATCC's standard methods of tests. Without a sound basis of measurement, founded on industry-wide accepted methods of test, our production would be chaotic and our progress hopelessly snarled. However, our research and technical program continues to lag behind the needs of the industry, but I am hopeful with more adequate financing in this area, we can increase our services. Mr Dorn, chairman of AATCC's Executive Committee on Research, will touch on this tonight, but I want to give emphasis to this point as it bears on our relations within the industry itself. There are still many companies which are not supporting the AATCC as Corporate Members. I would like to see our program and

*Presented before a joint meeting of the Delaware Valley and New York Sections at the Hotel Hildebrecht, Trenton, N J, September 13, 1957

our services become so vital to these companies that they could not afford to by-pass membership in AATCC. We now have a budget of $71,000 for the research phase of our operations. I want to see this increased to $100,000 by the end of 1958.

To the men and women in our industry, we have the responsibility for providing a common meeting ground where they may find the best in science and technology to aid them in their careers. The aims and objectives of our Association as conceived thirty-six years ago are just as practical and meaningful today. They represent our rallying point, and lest we take them for granted, I want to recite them verbatim from our Constitution: *first,* our object is to promote increase of knowledge of the application of dyes and chemicals in the textile industry; *second,* to encourage in any practical way research work on chemical processes and materials of importance to the textile industry; and *third,* to establish for the members a channel by which the interchange of professional knowledge among them may be increased.

Our present membership of some 7000 individuals by no means includes all those who are eligible for membership. Perhaps we have not made our program sufficiently attractive or perhaps they just haven't been asked to join the Association—I suspect the latter is the case in many instances. We have doubled our membership since the end of the war but we seem to have reached a plateau in the last few years. From this we either shrink or grow and I sincerely believe we have the will to grow. We should not have just 7,000 members—we should have 10,000 members across the breadth and width of the industry.

Today, the young people of our country are thinking about electronics, neucleonics and supersonics. We know they are not thinking much about careers in textiles. I wonder, if they knew that a textile college senior last June had two offers of $7,500 a year, if they would sit up and take notice. If they knew that our industry can provide careers comparable with other industries in opportunity for advancement and rewards in satisfaction and service, I feel sure that we would not have to worry so much about filling our ranks. We are beginning to do something about that, for we have recognized the need to build a reservoir of talent and promise for those to follow in our footsteps.

Now what can each of you do about all this—how can you help? If you agree with this program of action, here are a few ways, which if multiplied 7,000 times will give our Association a vigorous shot in the arm and new life.

1) Be ever watchful for new applications of processes and products. Make it your personal crusade to challenge every situation where textiles can do a job as well or better. In all you do and say, make those about you textile conscious.

2) Within the industry itself, we need your help to enlist corporate support. If your company is not a member, make it your personal mission to persuade your management of the benefits of AATCC's technical and research program. Let's boost that figure up to $100,000.

3) Appoint yourself a committee of one to bring in at least one new member. Take your candidate to lunch, take him to Section meetings, give him our literature and don't give up until you have his signature on a membership application.

4) Look around among the young people you know in high school and pick out a likely textile chemist. Take him through your plant. Talk to his parents and his high school advisor. Sell him on textiles. If you don't know anyone off-hand, get in touch with the high school chemistry teacher for a lead. Industry is recruiting college seniors. Let's beat them to the punch by recruiting high school sophomores.

Here is a four-point program tailored to each of you as members of the Association. In this way we can reinvest some of the dividends we have received through our membership and pass on to others our enthusiasm and belief in AATCC. You are the Association's best salesmen, and I am counting on every one of you to make a sale.

Thank you for the privilege of addressing you this evening. It is a great pleasure to be with you on this occasion and to take part in your program.

ADDRESS BY THE CHAIRMAN OF THE EXECUTIVE COMMITTEE ON RESEARCH

CHARLES W DORN

OVER the past year, some gradual changes have been taking place in an effort to reinforce the effectiveness of our research and technical program. I welcome this chance to discuss for the first time at a public meeting, the direction in which our thinking has been moving.

For you to fully understand what we are trying to do, I want to give you some background on the organization—or rather the reorganization, of our Association's facilities, which we hope will enable us to assume broader responsibilities. The national officers and others who have been close to our operations have determined that the executive Committee on Research can best serve the Association by handling policy matters and by acting as a research and technical program planning body. The execution of both policy and program, subject to the approval of the Council, AATCC's governing body, devolves on the Technical Committee on Research and its research committees. TCR, therefore, is administratively responsible for some forty

*Presented before a joint meeting of the Delaware Valley and New York Sections at the Hotel Hildebrecht, Trenton, N J, September 13, 1957

active research committees which report directly to it, and also 28 reference committees whose work has been completed but which may be reactivated, should the need arise for revision and review.

A new concept of staff service functions has been established at our national headquarters in Lowell, Mass, particularly with respect to committee support. This, together with redefinition of ECR and TCR, has given us a more clearly delineated view of our research program.

Each of our senior staff members serves in a liaison capacity between committees assigned to him and the Association's laboratories. He is in constant touch with the chairmen and members of his committee so that the work being done at the National Headquarters may be fully coordinated with the requirements for support of projects underway. Such support, in addition to developing laboratory data, may call for administrative assistance to committee chairmen.

The immediate supervision of the technical staff is in the competent hands of Dr Harold Stiegler, our director of research. The over-all responsibilities for staff operations in all departments rest with the executive secretary, George Paine. On matters relating to the research and technical program, he, aided by the director of research, acts on directives from the chairman of TCR, setting forth requirements for staff services for TCR and its research committees.

With this kind of organizational set-up, we are now able to evaluate our capabilities in more precise terms. It gives us a better picture of not only our limitations but draws our attention to new horizons of achievement.

We cannot become complacent nor self-satisfied, for while we have a going concern, we must raise our sights. Your president has called for a research budget of $100,000. Actually this is only $30,000 more than our present budget. I am going to reverse the old economic law of diminishing returns and outline what I believe can be a program of increasing returns, provided we can obtain the necessary funds from industry. We have the organizational framework with enough elasticity to double the productivity of every new dollar added to the budget.

AATCC Test Methods are nationally and internationally recognized. The development and revision of standard methods of test to meet our industry's needs is a major objective. We must keep up with the ever changing problems which beset our companies in their fight to hold their positions in the marketplace.

We need the answers to many problems—more and better answers than we have now. We need to know more about lightfastness. Washfastness in relation to home requirements demands better correlation of textiles with washing machine performance. In other fields, there is much to be learned, namely in antimicrobial finishes, the effect of perspiration on fabrics, skin irritation resulting from certain dyes and finishes, and damage to fabrics from retained chlorine. These are but a few examples of unsolved riddles. The future of wash-and-wear fabrics is challenging to the imagination—and what about the flammability characteristics of textiles as they are concerned with human safety? Our obligations go hand in hand with those of the industry we serve and extend to the public interest, to the home on main street and to the well-being of our fellow citizens.

I would like to see AATCC do more to explore industry's needs, to uncover hidden problems and anticipate the roadblocks to progress with investigation and study. We ought to have more time to puff our pipes and look out of windows, not so much in the area of fundamental research but in the cause and effect of applied technology in textile chemistry. We should not limit our program to test methods alone, but should act as a sounding-board for ideas, such as the current study of radio-active chemical techniques now being carried on under the auspices of the Piedmont Section at North Carolina State College.

We have a great potential for expanding our program beyond its present limits. We have had some experience in project management with the atomic tests, the Army Chemical Corps, the Quartermaster and the salt project. We can farm out a piece here and another piece there, providing the necessary coordination for the work and the evaluation of the over-all results. I see this as one of the most effective means available to us for enlarging our research capacity at minimum cost to the Association and to the industry.

We are broadening our cooperative efforts with other associations and professional societies. It may be of interest to you to know that among those organizations where a close working relationship exists are the American Society for Testing Materials, The American Standards Association, the National Fire Protection Association, the National Retail Dry Goods Association, the Textile Research Institute and agencies and departments of the federal government.

We are concerned with many problems arising between our industry and those of other countries. We are closely in touch with the Society of Dyers and Colourists, the Canadian Association of Textile Colourists and Chemists and the International Organization for Standardization. Only recently, we have formed a policy committee on international test methods to give closer scrutiny to our relationship to international activities. We believe that this is important not only to protect American interests but to join in the give and take of international negotiations as a means of exercising American leadership and as an opportunity to exchange ideas and technology with our opposite numbers in other countries.

But there are still many places in our own back yard where closer cooperative efforts are needed. I am thinking of our friends in the home appliance industry, in the laundry and drycleaning business, the automotive people, the soap and detergent manufacturers, the Armed Forces—to name but a few. We can help them and they can help us. Together we can profit.

It must be remembered that we are not in the business of setting standards but rather in developing a means for arriving at universal measurements. We are pleased when our test methods are recognized and used as yardsticks in determining standards—whether they be standards of an industry, another association, or a company. Part of our job is getting our test methods into the widest possible use to enable us to base our revisions on industry's day-to-day experience.

We have some four hundred experts serving on AATCC's research committees whose combined talents and time represent an astronomical investment. These men, and we have some ladies too, are volunteering their personal services and contributing a vast sum of knowledge to the welfare of our Association.

I wish to pay tribute tonight to their devotion to the work of the Association and to express our most grateful appreciation to them for all they are doing and have done for AATCC. If it were not for them, there would be no AATCC.

Membership Applications

September 20, 1957

SENIOR

A J Cofrancesco—Chemist, General Aniline & Film Corp, Rensselaer, NY. Sponsors: W Drautz, C Streck. (HM).

L A Cox—Director of research, Johnson & Johnson Ltd, Montreal, Canada. Sponsors: R D Bennett, C E Coke.

B H Eastridge, Jr—Research chem, Harris Research Labs, Washington, DC. Sponsors: L R Mizell, J Berch. (W).

L T Eby—Senior market development engineer, Enjay Co, Elizabeth, NJ. Sponsors: H R McCleary, J J Levitt. (NY).

H W Eckweiler—Consultant, chemical and allied fields, New York, NY. Sponsors: L Fusser, C Z Draves. (NY).

J J Hayden—Chemist, General Aniline & Film Corp, Rensselaer, NY. Sponsors: A E Herrmann, W Drautz. (HM).

F H Lieb—Material engineer (textiles & trim), Engineering Div, Chrysler Corp, Highland Park, Mich. Sponsors: W E Belanger, G P Paine. (MW).

J T Manning—Manager, Dye Dept, Standard Knitting Mills, Knoxville, Tenn. Sponsors: C W Braswell, E V Helms. (SC).

A F Plue—Chemist, General Aniline & Film Corp, Rensselaer, NY. Sponsors: A E Herrmann, W Drautz. (NY).

D A Plue—Supervising technician, General Aniline & Film Corp, Rensselaer, NY. Sponsors: W Drautz, R C Hall. (HM).

T R Scott, Jr—Section leader, textile operations, Research Sect, American Enka Corp, Enka, NC. Sponsors: O E Herzog, H L Reed. (P).

H Tovey—Tech Dept, Utilization Research Div, National Cotton Council of America, Washington, DC. Sponsors: N F Getchell, L Smith. (W).

H L Urban—Vice president, Dyestuffs Div, Verona Chemical Co, Union, NJ. Sponsors: W L Swenson, F E Hilger. (NY).

E I Welles—Research chemist, Dexter Chemical Corp, New York, NY. Sponsors: S M Edelstein, J B Evans. (NY).

JUNIOR

R W Boyer—Chemist, Jos Bancroft & Sons Co, Wilmington, Del. Sponsors: A L Lippert, R S Babiarz. (DV).

R N Josey—Lab superintendent, Collins & Aikman Corp, Albemarle, NC. Sponsors: J T Hasty, W D Hathcock. (P).

N H Mathias—Lab technician, Development center, B F Goodrich Chem Co, Avon Lake, O. Sponsors: A L Cate, H G Sommar. (MW).

ASSOCIATE

R D Cumming—Chief chemist, Eaton Chemical & Dyestuff Co, Detroit, Mich. (MW).

J P McNally—Chemical engineer, National Cotton Council of America, Washington, DC. (W).

G M O'Mahony—Technical service representative, The Chemstrand Corp, Decatur, Ala. Sponsors: R J Schuster, M E Mahony. (S).

R H Winter—Director of research, Nylco Products, Inc, Clinton, Mass. (NNE).

STUDENT

A Leblanc—St Hyacinthe Textile School, St Hyacinthe, Canada. Sponsor: G R Boule.

TRANSFER TO SENIOR MEMBERSHIP

C T Burgess. Sponsors: R L Smart, F O Tilson. (S).

J S Brice. Sponsors: R L Smart, C R Blumenstein. (S).

R S Brooks. Sponsors: F G Calkin, R L Smart. (S).

W A Geiler. Sponsors: R L Smart, R L Horney. (S).

J H Holmes. Sponsors: E R Ravenal, R L Smart. (SC).

S Mailo. Sponsors: J Pearlman, M G Bruckman. (NY).

R L Pruitt. Sponsors: A W Lanner, B A Ryberg. (MW).

W E Tiller. Sponsors: F G Calkin, R L Smart. (S).

C R Williams. Sponsors: S H Foster, E H Rossin. (WNE).

W P Williams. Sponsors: F G Calkin, R L Smart. (S).

AATCC Calendar

COUNCIL

Nov 14 (Lowell Technological Institute, Lowell, Mass); Jan 24 (New York, NY); May 23 (Philadelphia, Pa); Sept 19, 1958 (Piedmont area)

NATIONAL CONVENTIONS

Nov 14-16, 1957 (Hotel Statler, Boston); Oct 30-Nov 1, 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY)

DELAWARE VALLEY SECTION

Nov 1 (Kugler's Restaurant, Philadelphia, Pa); Dec 6 (Kugler's Restaurant, Philadelphia, Pa)

HUDSON-MOHAWK SECTION

Nov 22 (Johnstown, NY area); Jan 24 (Albany, NY); Mar 28 (Johnstown, NY area); May 16 (Ladies Night); June 20 (Summer outing)

MID-WEST SECTION

Oct 26, Feb 15 (Hotel Bismarck, Chicago, Ill); April 19 (Netherland Hilton Hotel, Cincinnati, O); June 13-14 (Outing—Browns Lake Resort, Burlington, Wis)

NEW YORK SECTION

Oct 18 (Kohler's Swiss Chalet, Rochelle Park, NJ); Dec 6, Feb 7 (New York, NY); April 11 (New Jersey area)

NIAGARA FRONTIER SECTION

Oct 25 (Joint meeting with CATCC Ontario Section at St Catherines, Ont); Dec 6, Feb 21 (Buffalo); Apr 4 (Joint meeting)

NORTHERN NEW ENGLAND SECTION

Dec 6 (Annual meeting, Hotel Continental, Cambridge, Mass)

RHODE ISLAND SECTION

Oct 24 (Providence Engineering Society, Providence, RI); Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

SOUTHEASTERN SECTION

Dec 7 (Atlanta Biltmore Hotel, Atlanta, Ga)

WASHINGTON SECTION

Oct 11 (Occidental Restaurant, Washington, DC)

WESTERN NEW ENGLAND SECTION

Nov 1 (Annual meeting, Hartford, Conn, area); Dec 13 (Rapp's Restaurant, Shelton, Conn)

Employment Register

57-12

Education: College of Charleston (SC), three years, chemistry.

Experience: 25 years dyer chemist and superintendent of dyeing—preboarding.

Age: 46; married; references.

Position desired: hosiery dyeing or research; liaison work with travel; domestic or foreign sales.

Location desired: South.

57-13

Education: New Bedford Institute of Textiles & Technology, B S, Textile Chemistry.

Experience: 7 years administrative (not in textile field).

Age: 25; married; veteran, USAF; references.

Location desired: Open — anywhere USA.

10-7, 10-21

Activities of the Local Sections

Delaware Valley-New York

THE Delaware Valley and New York Sections met jointly on September 13, 1957 at the Hotel Hildebrecht, Trenton, NJ, with approximately 200 in attendance.

Weldon G Helmus, Fair Lawn Finishing Co, AATCC vice president (Central Atlantic Region) presided over the meeting, which had as its theme, "AATCC Research".

In the absence of New Jersey governor Robert B Meyner, Commissioner Joseph A McLean of the Department of Conservation and Economic Development, welcomed the assembled group.

Short addresses were given by George O Linberg, AATCC president; George P Paine, executive secretary; and Charles W Dorn, chairman of the Executive Committee on Research. (The texts of Mr Linberg's and Mr Dorn's addresses appear elsewhere in this issue of *American Dyestuff Reporter*).

Frederick V Traut, chairman of the National Convention Committee, called attention to the dates of the 1957 Convention, which will be held November 14, 15, and 16 at the Hotel Statler, Boston, Mass.

Chief speaker of the evening was Joseph E Norton, Atlas Electric Devices Co, chairman of AATCC's Lightfastness Committee, who delivered a Committee report entitled, "A Study of the Variables Encountered in Natural Light Fading—Section I". The full report will appear in the November 4th issue of *American Dyestuff Reporter*.

Prior to the meeting, many members from both Sections availed themselves of the opportunity to tour the Textile Research Institute's facilities at Princeton, NJ.

The next meeting of the New York Section will be held October 18th at Kohler's Swiss Chalet, Rochelle Park, NJ, at which time Walter Hindle, Chemstrand Corp, will discuss "The Chem-Acril Process", a new method for the union dyeing of Acrilan-wool blends.

The Delaware Valley Section will meet next on November 1st at Kugler's Restaurant, Philadelphia, Pa.

Washington

THE Washington Section will meet this Friday, October 11, in the International Room of the Occidental Restaurant, Washington, DC, for its first meeting of the fall season.

Following a brief business meeting, George P Paine, executive secretary; and Charles W Dorn, chairman, Executive Committee on Research, will bring the Section up-to-date on national AATCC affairs.

The technical speaker of the evening will be Joseph H Brant, Harris Research Laboratories, who will discuss "The New Fibers".

During the business meeting, the Section's Nominating Committee will present a slate of officers for 1958.

Southeastern

SAMUEL L HAYES, Ciba Co, Inc, spoke on "The History of Dyeing" before 100 members of the Southeastern Section on September 13, 1957 at the Columbus (Ga) Country Club.

Sectional Committeeman H L Whittle, Reeves Bros, Columbus, Ga, was in charge of the meeting.

The technical session, at which Mr Hayes spoke, was followed by a social hour and dinner at the Club.

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National Headquarters

American Association of Textile Chemists and Colorists, PO Box 28, Lowell, Massachusetts

Northern New England

THE 32nd Annual Outing of the Northern New England Section was held September 13, 1957 at the Wachusett Country Club, West Boylston, Mass, under ideal late summer weather conditions.

James O Aronson, outing chairman, and David J Collins, assistant outing chairman, were aided by the following committeemen: *golf*—John Ormiston, Warren Lincoln, Basil Nicholson; *baseball*—John Murphy; *putting*—Walter Larkin; *horseshoe pitching*—Hans Walz; *fly casting*—Frank Benvie; *prizes*—Henry de Redon, Azel Mack; *dining*—John Markgren, Donald Thomas, Alfred LaLiberte.

Winners in the various golf categories were as follows:

Members, 0-13 handicap: 1st low gross—Walter Wood; 2nd low gross—Jay Bryant; 1st low net—Stanley Wade; 2nd low net—George MacDonald.

Members, 14-26 handicap: 1st low gross—Jack Barry; 2nd low gross—Thomas Walwood; 1st low net—Edward McNamara; 2nd low net—David Searle.

Members, 27 & up handicap: 1st low gross—Morris Campbell; 2nd low gross—Harry Hartnett; 1st low net—Herbert Briggs; 2nd low net—George Coble.

Guests: 1st low gross—R Remington; 2nd low gross—J B Manning; 1st low net—A Nuttall; 2nd low net—H Patten; 3rd low net—J Jones; 4th low net—M Quigley.

Robert Easdon took top honors in the putting contest followed by Glenn Jackson, 2nd, George Mandikos, 3rd, Harlan Glidden, 4th, and Earl Bullard, 5th.

In horseshoe pitching, John Markgren win the singles title. Donald Thomas and Herbert Williamson took the doubles honors.

Captain Gordon Smith led his baseball charges to a hard-fought, 7-inning, 6-5 win under the watchful eye of Harlan Glidden, umpire. Members of the winning team were: Paul Vannase, Clyde Newland, Earl Bullard, Robert Verlik, James Aronson, Edward Lynch, Jay Lincoln, and George Mandikos.

The famed Snake Killer Award for 1957 went to Kenneth Dorman.

your listing

of information concerning your new products that have been placed on the market *since November, 1956* (if you are a manufacturer of Dyestuffs, Textile Chemicals, Wet-Processing Machinery, Laboratory Equipment, or Incidentals for the Wet-Processing Plant).

is invited

for inclusion in the twenty-second annual PROCESSING REVIEW NUMBER of American Dyestuff Reporter, which will appear on December 2, 1957—an important issue of great value because of the complete data on new products issued in the past year.

SPECIFICATIONS:

Information should include the trade name of the product and a brief summary of its uses and properties. Please type (double-spaced) the information for each product on a separate sheet of paper (8½ x 11). If illustrations are necessary, glossy photos or black ink drawings should be furnished. If the trade name is registered or the product is patented and you wish these facts indicated, please so note.

DEADLINE:

In order to insure that your new products for wet-processing will be listed in this PROCESSING REVIEW NUMBER of December 2, information concerning them should be in our office NO LATER THAN NOVEMBER 4. It is important that you list only those products which have been brought out since November, 1956. Information should be addressed to The Editor, American Dyestuff Reporter, 44 East 23rd Street, New York 10.

American Dyestuff Reporter

Textile Wet Processing Exclusively ... Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

News of the Trade

Fabulized Finish

"Fabulized," a new finish intended to render synthetic-fiber fabrics and blends as absorbent, soft and comfortable to wear as those made from natural fibers, has been introduced by Fabulized, Inc, Philadelphia, Pa. Nylon hosiery, first Fabulized product to be tested and marketed, is now available in stores across the country.

Reportedly tested by an independent testing agency as having approximately four times the absorbency of regular-finished synthetic fabrics, Fabulized synthetics and blends are said to eliminate perspiration clamminess and the hot, close, uncomfortable feeling associated with nylon hosiery, shirts, blouses, dresses, sweaters, underwear, sleepwear, and other items made of synthetic fibers.

Accoring to John L Fancourt, president of Fabulized, Inc, and W F Fancourt Co, "There's nothing in the field that gives the absorbency to synthetics as Fabulized does. It provides a much higher degree of absorbency than antistatic agents," he said. "We predict that Fabulized will do for synthetic textile sales what Sanforized did for the cotton industry."

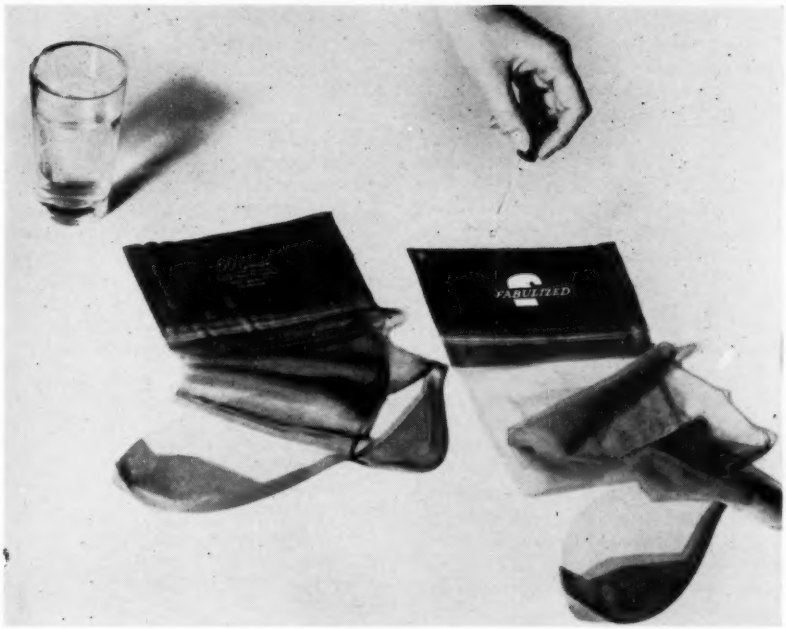
Test method used on nylon hosiery by the testing agency consisted of dropping swatches of Fabulized and non-Fabulized nylon hosiery fabric from the welt area from the height of one inch into a tray of water at room temperature. It is reported that, in 33.5 seconds (average) the Fabulized swatch was completely saturated, while at the end of a one-hour period, the non-Fabulized swatch was still floating on the surface of the water.

The Fabulized process reportedly needs no special mill equipment for application and costs no more to apply than standard type finishes.

Tests are now being conducted on other items of clothing and piece goods in all synthetic fabric fields, which will soon be made available to manufacturers, distributors and retailers.

A national advertising and public relations campaign covering the consumer and trade market will introduce and promote Fabulized.

The Fabulized finish is being marketed on a licensee basis.



A simple "eye-dropper test" proves the difference in the absorbency of Fabulized and non-Fabulized hosiery. Water is dropped from an eye-dropper on both the Fabulized-treated and untreated hosiery welts. On the Fabulized stocking, the water is instantly absorbed. On the non-Fabulized, the water drops remain on the surface over one hour.

Stein Hall Marketing Amylose and Amylopectin in US

The Technical Division of Stein Hall & Co, Inc has announced that amylose and amylopectin, the principal components of potato starch, are being marketed by them in commercial quantities in the US for the first time. Through an agreement with AVEBE (Coop Verkoop-en Productievereniging van Aardappelmeel en Derivaten "AVEBE" GA) of Veendam, Netherlands, Stein Hall has acquired exclusive sales rights in the United States and Canada on the Dutch firm's amylose and amylopectin. The products are now being separated on a commercial scale by a new AVEBE process.

Stein Hall expects to market the products in quantities of millions of pounds a year.

Applications for amylose are still largely experimental. Amylose, possessing film-forming properties, is expected to find widespread use in several markets, including textiles.

Amylopectin, which has properties somewhat like amioca, has been used in textile sizing and finishes to stiffen and strengthen fibers and prevent fuzziness.

Stein Hall will be actively engaged in research and the development of new markets for both these products, which will be supplied by AVEBE. "Superlose" has been selected as the name under which the company will sell amylose, while "Ramalin" is the name for amylopectin.

PTI Opens 75th Fall Semester

One hundred and five freshmen registered at the Philadelphia Textile Institute, Philadelphia, Pa on Monday and Tuesday, September 9th and 10th, as the college opened its 75th fall semester.

Two hundred and fifty-one upper classmen registered on Wednesday, the 11th, and classes for all students began Thursday, September 12th.

Of the freshman class, 64 are American students and 41 are from 14 foreign countries.

The freshman class shows 44 registrants for the Textile Engineering degree course; 33 for Textile Management and Marketing; 15 for Textile Chemistry and Dyeing; ten for the new Fabric Design course; and 3 students sent by industry for special day courses.

PTI students will have the advantage of the recently expanded Hesslein Library. The new wing of the building, added at a cost of $60,000, will provide ample space for the housing of one of the finest collections of textile literature in the country.

Complete microfilming equipment was also added to the library this summer.

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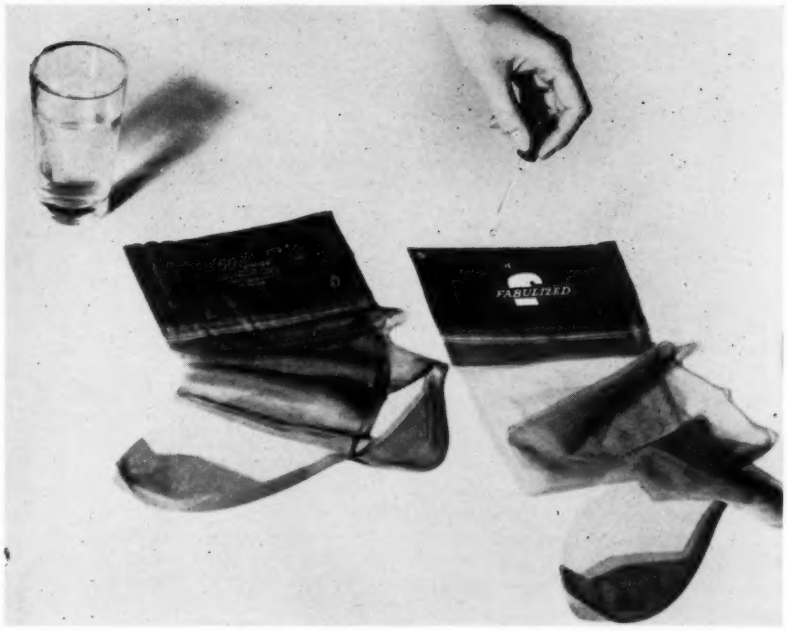

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Lyman Printing New "Everglaze" Licensee

Joseph Bancroft & Sons Co and M Lowenstein & Sons, Inc, have jointly announced that Lyman Printing & Finishing Co, Inc, a Lowenstein subsidiary, has become a licensee of finishing processes owned by Bancroft and its trademark "Everglaze".

Lyman Printing & Finishing Co, Inc was organized to acquire the Lyman Finishing Plant when Lowenstein purchased the Cotton Division of Pacific Mills in 1955.

OESDI Collecting UV Spectral Data

Organic Electronic Spectral Data, Inc, Silver Spring, Md, has announced receipt of a $1,000 contribution from Beckman Instruments, Inc, to help underwrite preparation of the most comprehensive collection of ultraviolet spectral data ever attempted.

H E Ungnade of Los Alamos Scientific Laboratory, president of the nonprofit OESDI, said the collection may include descriptions of as many as 50,000 ultraviolet absorption spectra of organic compounds. Purpose of the project is "to make available in one definitive reference a majority of such data published since the onset of the photoelectric era."

Forty scientists from government, industry and universities are cooperating in the venture and the material is being abstracted from 65 journals in 8 languages. Since the start of the project, early this year, over 21,000 spectra have been collected.

The first two-volume set of "Organic Electronic Spectral Data" will be published next year by Interscience Publishers, Inc, New York, NY, under the editorship of Mortimer J Kamlet of the U S Naval Ordnance Laboratory of White Oak, Silver Spring, Md, and Dr Ungnade. It will cover the literature from 1946-1955 and will run probably more than 2,000 pages.

Booklet on Optical Bleaches

A booklet explaining the nature and behavior of Tinopal "optical bleaches" and application details of same to cellulosic fibers has been published by Geigy Dyestuffs, Division of Geigy Chemical Corporation.

The brochure points out in its preface that the widespread use of so-called optical bleaches by the textile and detergent industries has led to the development of fluorescent whitening agents for producing "whiter" whites than have been heretofore possible. Geigy has developed many variations of Tinopals for the different natural and man-made fibres, and for different finishing or dyeing operations. The pamphlet gives specific recommendations, based on research and experience with users, for each of the different whitening agents developed for cellulosic fibers.

For those unfamiliar with the properties of optical bleaches, the brochure explains that, while they possess no color immediately apparent to the eye, they convert a portion of the invisible ultra violet light present into visible light of a predominantly bluish hue, thereby increasing the whiteness and brightness of fibers, yarns and fabrics. The effect is said to be strikingly superior to that obtained by the use of bluing with pigments or selected dyestuffs. Tinopals add emitted blue light without subtracting from the visible components of the striking or impinging light, thereby not only overcoming the yellowness but also making the shade of white brighter.

Copies of the brochure may be obtained from Geigy representatives at branch offices. They may also be obtained by writing directly to Geigy Dyestuffs, Division of Geigy Chemical Corporation, Saw Mill River Road, Ardsley, NY, or, in Canada, to P O Box 33, New Toronto, Toronto 14, Ontario.

Procion Resist Agent

Superior performance in obtaining white resists under ground shades padded or cover-printed with the Procion dyestuffs is claimed for the new Procion Resist Agent recently introduced by Arnold, Hoffman & Co, Inc, Providence, RI.

The Procion Resist Agent is said to give excellent white resists under Procion dyestuffs when used in a British gum thickening, and the printed fabrics reportedly possess good storage stability. It is stated that attractive possibilities are offered the printer, who may use the Procion Resist Agent to produce high-quality white resists under Procion ground shades, in many cases without the need for steaming. It is also suggested that he may produce white resists alongside vat dye illuminated resists under padded Procion grounds.

In the latter style, according to Arnold, Hoffman, the steaming treatment given to fix the vat dyestuffs also fixes the Procion ground shade. The vat dyes are printed by the normal potassium carbonate/sodium sulfoxylateformaldehyde formula. It is reported that the resulting prints have the high fastness to light, wet and rubbing said to be characteristic of the Procions, combined in many cases with attractive novelty of shade.

Arnold, Hoffman notes that a further advantage of the new Procion Resist Agent is its ease of removal by a short treatment in boiling detergent and soda ash, in the event that faulty printing should be detected before over-padding with the Procions.

The Procion Resist Agent is described as a pale straw-colored liquid, easy to handle and measure. British gum thickening is recommended for use with it, because the two are said to be fully compatible. In addition, British gum thickening has advantageous reducing properties, does not produce undesirable harshness in the printed fabric, and has a high solids content which contributes to the desirable mechanical properties of the resist, it is claimed.

Currently, the Procion dyes range is comprised of yellows, blues, reds and orange. In addition to their technical merits, their outstanding features are said to be brilliance, simplicity of application, and good fastness.

Lanolube

Lanolube, a lanolin emulsion recently developed by Richmond Oil, Soap & Chemical Co, Philadelphia, Pa, is said to give a firm, soft hand and improve dulling characteristics when used in conjunction with polyvinylacetate finishes on nylon hosiery.

Lanolube contains a high percentage of a specialized lubricant, which is said to eliminate the necessity of using an additional board lubricant in the finish bath.

The product reportedly is compatible with most synthetic resins and dullers.

A technical data sheet giving chemical and physical properties and application directions for regular hosiery and stretch nylon hosiery processing is available from Richmond Oil, Soap & Chemical Co.

Kal-Co-Dac

Kal-Co-Dac, a new product for use in the sizing of cotton and cotton-Dacron warps, has been developed in the research laboratories of Kali Mfg Co, 427 E Moyer St., Philadelphia 25, Pa.

The product, a pale amber, water-soluble, semiviscous liquid, reportedly adds strength to the yarn, reduces shedding of size, increases elongation of the yarn, scours out readily, and will not mildew. It is said to be low in cost and may be used in current sizing formulas without change.

• NAMES IN THE NEWS •

Cloney

Robinson

Harold G Shelton, recently appointed director of marketing for the Dyestuff and Chemical Division of General Aniline & Film Corporation, announced on Sept 16th the appointment of two executives to his staff.

James M Cloney succeeds Mr Shelton as sales manager of Antara Chemicals and **John T Robinson** has been named to the newly created position of director-sales administration for the Dyestuff and Chemical Division. Mr Cloney, a sales executive with Antara since 1946, will direct sales and marketing operations for the Division's chemical products, including those from the Company's new high-pressure acetylene plant at Calvert City, Ky. Mr Robinson's duties will encompass the study of existing marketing practices within the Division as well as the further development and administration of operations in this area.

Until his appointment to his new post, Mr Cloney was manager of the Organic Chemicals Department and served variously as manager of special products sales, market manager, and regional manager on the West Coast.

Mr Robinson has had wide experience in marketing, organizational and financial planning as a management consultant, first with McKinsey & Company and more recently with Bruce Payne & Associates.

Samuel L Hayes, manager of the Southern District of Ciba Co, Inc, with headquarters in Charlotte, NC, recently celebrated a milestone in his career. He was the guest of honor at a dinner held at the City Club, at which **H Marshall**, president of the Company, presented Mr Hayes with a gold watch, commemorating his twenty-five years of service at Ciba.

Among those attending the dinner were many past and present members of the Ciba 25-Year Club, representatives of Ciba corporative management and associates from the Ciba Southern District offices.

Herbert S Morrow, a charter member of AATCC, veteran executive of American Cyanamid Co, and in recent years a consultant to Cyanamid's Fibers and Organic Chemicals Divisions, is retiring from activity in the chemical industry.

Mr Morrow joined Cyanamid 22 years ago. From 1935 to 1945 he served as technical service manager of the Calco Chemical Division at Bound Brook, NJ, and in the following seven years was in charge of sales promotion for the Division, with headquarters at 40 Worth Street, New York. From 1952 to 1956 he was consultant to the Dyes Department of Cyanamid's Organic Chemicals Division, and during the past year he has been a consultant to the company's Fibers Division.

Before joining Cyanamid, Mr Morrow worked for several cotton dyeing and finishing companies in Delaware, Connecticut and Rhode Island. He was a director of the Queen Dyeing Co, Providence, R I, and also of Joseph Bancroft & Sons, Wilmington, Del.

Appointment of **Stanley R Detrick** to the newly created position of assistant director of sales for chemicals in Du Pont's Dyes and Chemicals Division was announced Sept 12th. **Gordon M Markle** will continue as the division's assistant director of sales for dyes.

Dr Detrick joined the Du Pont Company in 1930 as a research chemist in the Sulfur Colors Division of the company's Jackson Laboratory, Deepwater Point, NJ. In 1953 he was named technical manager of the chemicals and auxiliaries group of the Dyes and Chemicals Division. He was appointed sales manager of the chemicals and auxiliaries group of the Dyes and Chemicals Division in February, 1956.

Geigy Dyestuffs, Division of Geigy Chemical Corporation, Ardsley, NY, has announced the appointment of **Herman L Steen** as sales manager for that Division.

Mr Steen entered the employ of Geigy 22 years ago as laboratory technician, following which he was made a salesman in the Metropolitan-New York area and Connecticut. On the retirement of R L Quinn, Mr Steen was appointed branch manager in Philadelphia, which position has now been assigned to **F W Allendorf**.

Mr Steen will make his headquarters in Ardsley.

Tesoro

Epstein

Giuliana C Tesoro and **Morton B Epstein** have been named to new research staff positions at Onyx Oil & Chemical Co, Jersey City, NJ.

Dr Tesoro, who has served Onyx as assistant director of research since 1955, moves up to associate director of research.

Dr Epstein, former head of the Applications Research Department, has been elevated to assistant director of research.

Mario J Cardone has joined the Chemical Division of the Borden Company as head of the analytical research group at its Philadelphia Research Laboratory.

A specialist in absorption spectroscopy, Mr Cardone came to Borden's following two years with Wyandotte Chemicals Corporation. In his new position, he will be responsible for developing new methods for analyzing and processing synthetic resins and plastics.

The Carwin Co, North Haven, Conn, has announced the appointment of **Edward D Walen** as assistant to the president, and **Paul M LaFlamme** to the Research Department. Mr Walen was formerly plant manager of Pacific Mills' Brookneal Mills and previously assistant director of research of Pacific Mills' Worsted Division. Mr LaFlamme recently completed his PhD requirements at Yale Univ.

Carwin has also announced the promotion of **R Bruce Baptie** to the sales organization from his former position as development superintendent. He is succeeded in the latter post by **Harry E Smeal**, formerly with Dow Chemical Co.

E F Feeley Co, Boston, Mass, has named **William D Blackmon, Jr** technical sales representative in Tennessee, Georgia and Alabama. Mr Blackmon, who was formerly associated with Sandoz, Inc, will make his headquarters in Cleveland, Tenn.

Alfred L Peiker has been named director of the Stamford Research Laboratories, Research Division, American Cyanamid Company.

Dr Peiker, formerly director of the Product Research Department of the Stamford Laboratories, joined Cyanamid in 1934 as a research chemist in the former Calco Chemical Division at Bound Brook, N J. He became a group leader in 1939 and assistant director of the Physical Chemical Section in 1944. While at Bound Brook, he also served as manager of the Dyes Technical Service Laboratory, and manager of the Textile Resin Department. In 1953 he transferred to Stamford as director of the Development Division and became director of the Product Research Department in 1954.

Sun Chemical Corporation has announced the appointment of **John J Watson** as advertising manager, chemicals group.

Mr Watson will be responsible for the advertising programs of the divisions and subsidiaries in Sun's chemicals group, including Warwick Chemical division (textile and industrial chemicals).

Mr Watson joined Sun Chemical in February, 1957, as assistant to the advertising director, having been previously affiliated with Benton and Bowles, Inc, advertising agency. He will remain in the headquarters offices of Sun Chemical Corp in Long Island City, New York.

General Latex and Chemical Corp, Cambridge, Mass, has announced the appointment of **Ted E Lannefeld** and **John B Baker** as sales representatives in the New England territory.

Mr Lannefeld had formerly been associated with Heavatex Corp in technical sales in both New England and the Midwest territories.

Mr Baker had, for the last several years, represented Abrasive Products Inc in the Midwest territory.

Kauffmann

HUGO J KAUFFMANN

HUGO J KAUFFMANN, an outstanding research scientist in the field of physical chemistry and a member of the research staff of Becco Chemical Division, Food Machinery and Chemical Corporation, Buffalo, NY, died on August 31 in Buffalo after an illness of many months. He was 87. He was the father of H O Kauffmann, Becco's technical director.

Dr Kauffmann was born in Ludwigsburg, Germany, July 27, 1870, and studied chemistry at the Technische Hochschule in Stuttgart and at the University of Heidelberg, from which he received his PhD in chemistry in 1892. After graduation he continued his studies at the University of Geneva.

He then joined the faculty of the Technische Hochschule in Stuttgart as professor of chemistry, and during his stay there pursued his own studies of the relationship of physical properties and chemical constitution of compounds, and of free radical mechanism. Here, also, he published ***Valenzlehre,*** which is still a widely used book.

Later, Dr Kauffmann joined the staff of the Textile Institute at Reutlingen, where he not only taught chemistry but also did research on basic reactions of cellulose. His achievements in this field and related fields of textile chemistry earned him a considerable reputation and much of his work was sponsored by German industry, notably by I G Farben and Henkel. Dr Kauffmann also lectured extensively on these subjects throughout Europe.

In 1939 he came to the United States and joined the staff of Becco Chemical Division, Food Machinery and Chemical Corporation, in Buffalo, as a research scientist working primarily on oxidation mechanisms and kinetics. He published the results of his work in the ***Journal of the American Chemical Society,*** and also took out a number of patents.

Dr Kauffmann was a member of the American Chemical Society and also of the Deutsche Chemische Gesellschaft.

General Calendar

AMERICAN OIL CHEMISTS SOCIETY
Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles)

AMERICAN SOCIETY FOR QUALITY CONTROL—TEXTILE DIVISION
8th Annual Conference—Jan 30-Feb 1, Clemson House, Clemson, SC

AMERICAN SOCIETY FOR TESTING MATERIALS (COMMITTEE D-13)
Oct 15-18 (Fall meeting, Sheraton McAlpin Hotel, New York, NY); Mar 18-21 (Spring Meeting, Sheraton Park Hotel, Washington, DC).

THE FIBER SOCIETY
April 30—May 1 (The Clemson House, Clemson, SC)

PHI PSI TEXTILE FRATERNITY
April 24-26 (Annual Convention, Philadelphia, Pa)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Oct 8, Nov 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY)

Abstracts—

(*Concluded from page 738*)

should be added to the bath before the dye, and in an amount only just sufficient to chelate the undesirable metal ions.

The author points out that the neutral-dyeing metal complex dyes are unaffected by EDTA, probably because the dyebath has a higher pH, where the dye/metal complex is more stable than the EDTA/metal complex.

The author mentions a number of wool dyes which are sensitive to the presence of metals (eg, copper and iron) in the dyebath, where the addition of EDTA completely corrects the effect of the metal. He also briefly refers to applications of EDTA in dyeing with sulfur, vat and acetate dyes.—WHC

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• Emkafol	• Emkanet	• Emkasol	• Rexobond	• Rexolene		
• Emkagen	• Emkanol	• Emkatard	• Rexoclean	• Rexoloid		
• Emkalane	• Emkapel	• Emkatex	• Rexodull	• Rexolube		
• Emkalar	• Emkapene	• Emkatol M	• Rexofos	• Rexopene		

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